A STREET & SMITH PUBLICATION

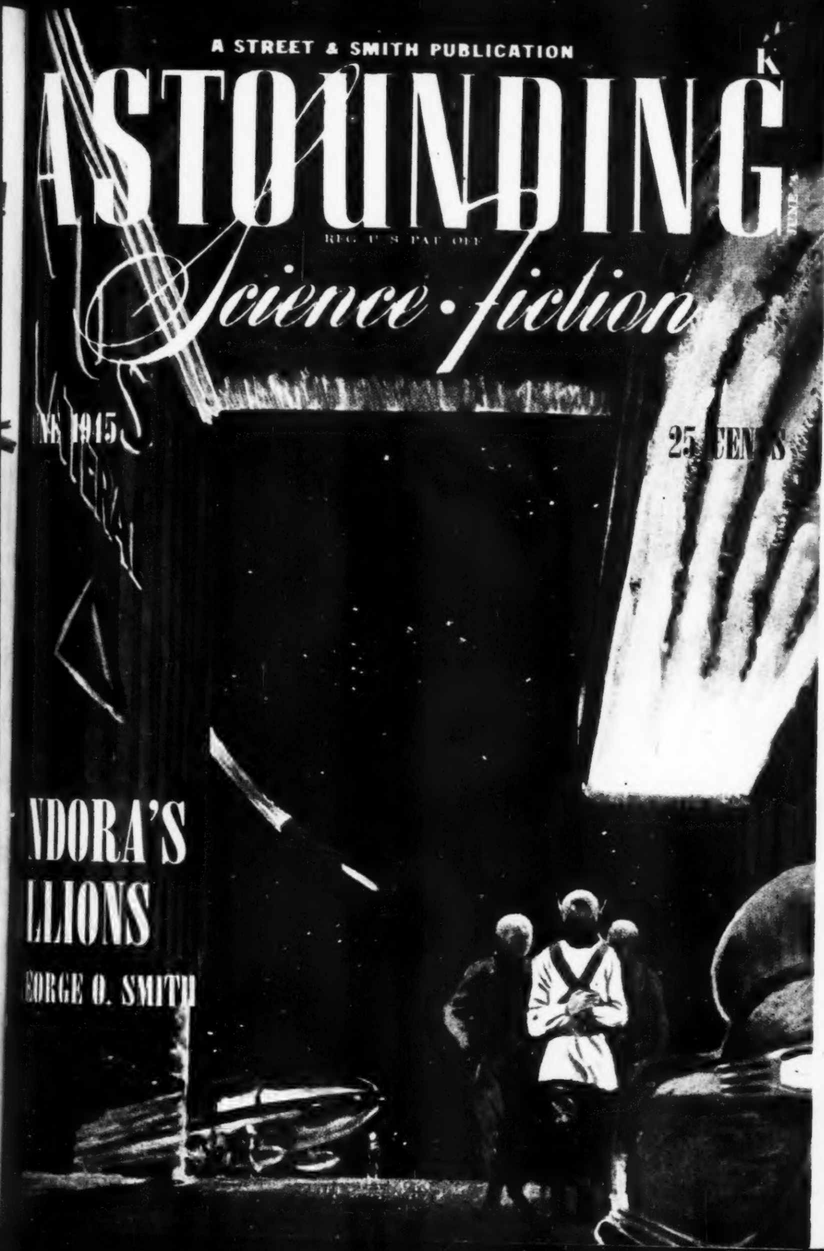
# ASTOUNDING

REG. U. S. PAT. OFF.

# Science-fiction

NE 1945

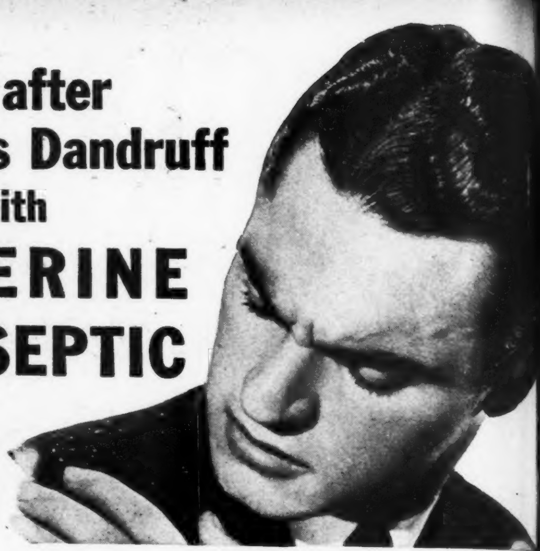
25 CENTS



## NDORA'S
## LLIONS

EORGE O. SMITH

# Get after Infectious Dandruff with LISTERINE ANTISEPTIC NOW!



**Quick Germicidal Action Kills the "Bottle Bacillus" by millions, and Helps to Restore Scalp to Normal Condition.**

If there's a telltale shower of excess flakes and scales when you comb your hair . . . take heed!

They can be evidence that a case of infectious dandruff is getting started and may be well on its way.

This is no time for "over-night" remedies that have no germ-killing power. The emergency calls for real germicidal action and massage—right now!

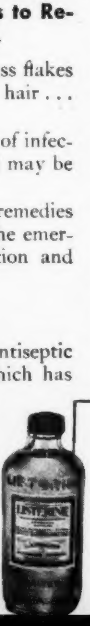
### Kills "Bottle Bacillus"

Start immediately with Listerine Antiseptic twice a day, a tested treatment which has brought help to so many and which may bring help to you. Remember, this is the treatment that in clinical tests brought improvement, or complete relief, to 76% of dandruff sufferers in 30 days.

Listerine Antiseptic gets after the germs themselves. Kills literally m of the threatening "bottle bacillus" they can multiply further. Meantime nasty flakes and scales that distress begin to disappear, and that painful is quickly relieved. Your scalp glow tingles with a new feeling of health. hair feels wonderfully fresh. The trea is as simple and easy as it is delightful.

You simply douse full strength Lis Antiseptic on the scalp and follow with orous, rotary, fingertip massage for se minutes. Thousands who are not tro with infectious dandruff use Listerine septic as a precaution against it, mak a part of their usual hair-washing.

Lambert Pharmacal Co., *St. Louis,*



**The TREATMENT**

**WOMEN:** Part the hair at various places, and apply Listerine Antiseptic. **ME** Douse full strength Listerine on the scal morning and night. Always follow wi vigorous and persistent massage. Listeri is the same antiseptic that has been fa mous for more than 60 years in the fi of oral hygiene.

**the tested treatment**

# "I'm Saving Paper For My Daddy"

Millions of fathers and sons in uniform today depend on the paper required to make or wrap over 700,000 vital war items.

Paper is still a No. 1 war material shortage. Last year's collection of 7,000,000 tons wasn't enough. 8,000,000 tons must be collected this year to meet the essential needs of the battlefront and homefront. So please save every scrap!

And remember, your paper now has a chance to serve *twice*. In some localities, funds from the sale of waste paper are being devoted more and more to buying little extras for wounded veterans. Or the money can go to other worthy community projects.

**Separate and tie in bundles: 1. Wastebasket scraps. 2. Corrugated boxes, brown paper and bags. 3. Old magazines and books. 4. Newspapers.**

DOUBLE V V PROGRAM
SAVE WASTE PAPER
V TO SPEED VICTORY
V TO AID VETERANS

**This advertisement prepared by the War Advertising Council in cooperation with the War Production Board and the Office of War Information.**

**This advertisement contributed to Double-V Waste Paper Program by this publication.**

# ASTOUNDING
## SCIENCE FICTION

Reg. U. S. Pat. Off.

## CONTENTS

JUNE, 1945 VOL. XXXV, NO. 4

### NOVELETTES

PANDORA'S MILLIONS, *by George O. Smith* . . 7
THREE BLIND MICE, by Lewis Padgett . . . . 68
THE GOLDEN JOURNEY, *by A. Bertram Chandler* 138

### SHORT STORIES

HEIR APPARENT, *by A. E. van Vogt* . . . . . 32
SCHEDULE, *by Harry Walton* . . . . . . . 54
THE ETHICAL EQUATIONS, *by Murray Leinster* 117

### ARTICLE

PREDICTION—PAST TENSE, *by R. S. Richardson* 99

### READERS' DEPARTMENTS

THE EDITOR'S PAGE . . . . . . . 5
IN TIMES TO COME . . . . . . . . . . 31
THE ANALYTICAL LABORATORY . . . 97
BRASS TACKS . . . . . . . . . . . 134

COVER BY TIMMINS

Illustrations by Orban and Williams

*Editor*
JOHN W. CAMPBELL, JR.

The editorial contents have not been published before, are protected by copyright and cannot be reprinted without publisher's permission. All stories in this magazine are fiction. No actual persons are designated by name or character. Any similarity is coincidental.

Monthly publication issued by Street & Smith Publications, Incorporated, 122 East 42nd Street, New York 17, N. Y. Allen L. Grammer, President; Gerald H. Smith, Vice President and Treasurer; Henry W. Ralston, Vice President and Secretary. Copyright, 1945, in U. S. A. and Great Britain by Street & Smith Publications, Inc. Reentered as Second-class Matter, February 7, 1938, at the Post Office at New York, under Act of Congress of March 3, 1879. Subscriptions to Countries in Pan American Union, $2.75 per year; elsewhere, $3.25 per year. We cannot accept responsibility for unsolicited manuscripts or artwork. Any material submitted must include return postage.

$2.50 per Year in U.S. A. Printed in the U. S. A. 25c per Copy

NEXT ISSUE ON SALE JUNE 19, 1945

# Communication and Noncommunication

The new field of radio-electronics rather generally—if wrongly—implied by the term "radar" is more properly described as "noncommunication radio." It covers everything from blind landing and flying systems through radar to certain applications of electronic heating. It's a new, and a very important, field in most of its aspects—and almost entirely a new field in any real engineering sense. Lab demonstrations have been available for years.

Communication radio, both audio and visual, are due for a tremendous expansion after the war; the Federal Communications Commission has already started moves in that direction. The Army's walkie-talkie, and the even more compact "handie-talkie," have pointed up the immense utility of a small, completely portable radio communication instrument—and its practicable attainment with the present state of the art.

Television is getting an immense amount of publicity, and there's a lot of anxious waiting for the post-war availability of receivers. That makes three general fields of post-war radio-electronics that seem slated for a real boom. Anything obvious that's apt to hamper them?

One of the things that kept noncommunication electronics way in the background before the war was the total lack of adequately trained servicemen. The average radio mechanic had spent a good many years learning his trade—learning the tricks that made repairing defunct sets easier and quicker. He knew radio sets as well as he knew the pattern of his town's streets. He knew that if a Railroad Special Superwhistlerdyne was brought in with the complaint that it hummed, the trouble would almost certainly be in the first filter condenser. Of course, a hum of similar character in an Emit Console model would, on the other hand, be due to a shot converter cathode by-pass condenser in all probability. That was his business. But his business did not include some of the handy, but highly unorthodox—from the strictly radio point of view—screw-ball circuits used in nonradio electronics. If a radio set amplifier develops a habit of chopping the tops and bottoms of the sine waves off, the results are horrid. But that's a grand way to get square waves for some control system purposes.

Noncommunication electronics, whether for radio uses, as in radar and the like, or for controlling industrial machinery, involves unusual applications of tubes of a usual sort. The Army and Navy have trained an army of servicemen; post-war industry can use the enormous advantages of electronic controls because there will be available men capable of servicing them.

Whether electronic cooking will be practicable or not is open to question; the fact that thousands of men have been trained in the handling of the high voltages, and high-power tubes necessary, will make it a lot more nearly practicable, in any case.

Just as the walkie-talkie was introduced by the Army, the men trained sufficiently to service the transceivers involved will have Army training. Though the problems encountered in such small transmitters as those involved in walkie-talkies are fairly readily picked up by any competent radio mechanic.

These walkie-talkie type transceivers, the FCC now apparently plans, will be used by anyone wanting them, with a very minimum of red tape. The rather elaborate examination for a license required before a radio ham is permitted on the air will not be required for operation of these sets. But, on the other hand, they'll meet another type of snag; the range will be strictly limited. They will, of course, be low-power rigs, but even a full fifty thousand watt broadcast-station transmitter installation working on those frequencies—up in the hundreds of megacycles—has no greater range than a little battery-operated squealer. Those frequencies don't bounce from the Heavieside Layer; they go on out to the stars. They can, therefore, be picked up only in line-of-sight ranges, which means a few tens of miles, no matter what their power. That feature makes their use possible; if that limit were not the case, there would be too few channels available. As it is, a transmitter in New York can't be picked up in New Haven, Philadelphia, or, quite probably, even in New Brunswick, New Jersey, and vice versa.

The gadgets will be very useful for doctors, deliverymen, etcetera, in the small towns of the Great Plains country. They'll be helpful for hunters and vacationers. I have a strong hunch they won't be worth the bother, let alone the expense of maintenance, in any great urban area. Those frequencies, limited in range because they won't bounce off of the upper atmosphere, are even more limited because they will bounce, bounce like a golf ball, from almost any large solid object. Buildings are bad; gas-holders are worse. Nobody would ever have any way of knowing whether or not he was going to be able to get the called station or not—and most of the time, not. Rocky Mountain country is beautiful scenery—but those ultra-short waves sing "Don't Fence Me In!", bounce off the nearest hillside, and head for the wide open interstellar spaces.

Frequency modulation stations are now working on a band of frequencies between about forty and sixty megacycles. The FCC apparently wants to shift them from there to the region around one hundred ten megacycles. A lot of owners of FM sets are annoyed; owners of FM transmitters aren't happy. There may be a reason in that bouncing effect though. There'll be a lot of private flying in the post-war era—the Army and Navy have trained a lot of highly competent plane pilots, too—and that means private landing fields. Those fields need radio beacon frequencies, control tower frequencies and the like. It's a fine idea to have that pigeon sanse Raymond Jones described in the March 1945 Astounding, and follow the beacon home to your field on a dark and rainy night. But it might be extremely annoying to discover, very abruptly, that you were homing on the local gas holder—from which the airport's beam was bouncing.

The airports need frequencies that don't bounce quite so much—a band that is, at present, being used by FM stations.

Finally, television, my own guess is, may never reach the stage of being in everybody's home, as radio broadcast receivers now are. Why?

Radio receivers today are used largely for three types of entertainment—from the receiver owner's viewpoint. It is used to pick up certain programs which the listener wants to hear. Such programs as dramatic and comedy and news reports; to a lesser extent symphony programs. Second, it is used by housewives, evidently, as a sort of anaesthetic gadget while doing the routine, boring household tasks. The listener's mind isn't made so conscious of the dull job. The soap-opera programs are designed to catch that audience. Third, and by far the greatest use for radio, is as background music for some other occupation. Is your set on at the moment, for such a purpose? It may be a bridge game, a magazine or book, or the monthly bills that is in the forefront of your consciousness; the music is a very pleasant and unobtrusive background.

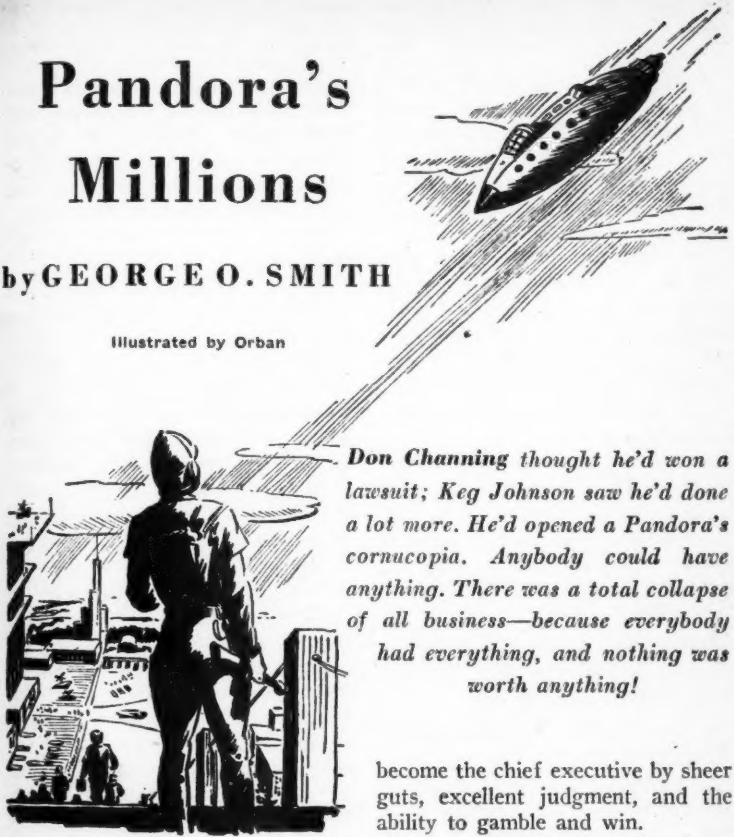
Of those three functions, television can supply only one. It can't be unobtrusive; you have to watch it. But you can't watch it, if you're doing housework, bills, playing bridge, or reading. And dialogue cast for television use is unintelligible unless you *do* watch; try following the sense of a motion picture sometime by closing your eyes and listening only to the sound accompaniment. Even the music sounds bad; it was paced to point up and emphasize the action, not to be listened to for itself alone.

My own hunch is that too few people will buy the expensive, four hundred dollar television receivers to support the commercial advertiser's very expensive show. Television, however, has an entirely different sort of possibility that will find wide application. Lack of space now forces continuation of the proposition till next month. THE EDITOR.

# Pandora's Millions

### by GEORGE O. SMITH

Illustrated by Orban



***Don Channing** thought he'd won a lawsuit; Keg Johnson saw he'd done a lot more. He'd opened a Pandora's cornucopia. Anybody could have anything. There was a total collapse of all business—because everybody had everything, and nothing was worth anything!*

*"A lot has been written about mankind starving amid plenty. But never before was a civilization confronted with the prospect of luxury amid bankruptcy—"*

Keg Johnson was the executive type. He was the chief executive of Interplanet Transport, a position of no mean height. Keg had become the chief executive by sheer guts, excellent judgment, and the ability to gamble and win.

Like any high executive in a culture based on a technical background, Keg was well aware of science. He was no master of the scientific method nor of laboratory technique. He was able to understand most of the long-haired concepts if they were presented in words of less than nine syllables, and he was more than anxious to make use of any scientific discovery that came from the laboratory. He knew that the laboratory paid off in the long run.

Keg Johnson was strictly a good business man. He played a good game and usually won, because he could size up any situation at a glance and prepare his next move while his opponent was finishing his preparatory speech.

So when Keg Johnson met Don Channing in the hallway of the courtroom in Buffalo, he was dangling an exact duplicate of the judge's watch—a timepiece no longer a rare collector's item.

He waved the watch before Channing's face.

"Brother," he said with a worried smile, "what have you done!"

"We won," said Channing cheerfully.

"You've lost!" said Keg.

"Lost?"

Keg's eyes followed the Terran Electric lawyer, Mark Kingman, as he left the courtroom.

"He's been trying to put you out of business for a couple of years, Don, without any success. But you just put your own self out of commish. Venus Equilateral is about done for, Channing."

"Meaning?" asked Don, lowering his eyebrows. "Seems to me that you're the one that should worry. As I said, we'll give you your opportunity to buy in."

"Interplanet Transport is finished," agreed Johnson. He did not seem overly worried about the prospect of tossing a triplanetary corporation into the furnace. "So is Venus Equilateral."

"Do go on," snapped Don. "It seems to me that we've just begun. We can take over the job of shipping on the beams. The matter-transmitter will take anything but life, so far. Pick it up here, shove it down the communications beams and get it over there. Just like that."

"That's wonderful," said Keg in a scathing voice. "But who and why will ship what?"

"Huh?"

"Once they get recordings of Palanortis Whitewood logs on Mars, will we ship? Once they get recordings of the Martian Legal to Northern Landing, who will take the time to make the run by ship?"

"Right," agreed Channing.

"The bulk of your business, my brilliant friend, comes not from lovesick swains calling up their gal friends across a hundred million miles of space. It comes from men sending orders to ship thirty thousand tons of Venusian Arachnia-web to Terra, and to ship ten thousand fliers to Southern Point, Venus, and to send fifty thousand cylinders of acetylene to the Solar Observatory on Mercury, and so forth. Follow me?"

"I think so," said Channing slowly. "There'll still be need for communications, though."

"Sure. And also spacelines. But there's one more item, fella."

"Yes?"

"You've got a terrific laboratory job ahead of you, Don. It is one that must be done—and quick! You owe it to the world, and to yourself, and to your children, and their children's children. You've brought forth the possibility of a system of plenty, Don, and left it without one very necessary item.

*"Channing, can you make one item that can not be duplicated?"*

"No, but—"

"Uh-huh. Now we go back to barter and exchange."

"Golly!"

"Furthermore, chum, what are you going to barter with? A ton of pure gold is the same value as a ton of pure silver. That is, aside from their relative technical values. A ton of pure radium won't bother us at all, and if we want Uranium Two-thirty-five, we make it by the ton also. Oh brother, *you've really screwed the works this time."*

"Now what?"

"You and your crew start looking for something that is absolutely un-reproducible. It should be a light, metalloid substance of readily identifiable nature, and it should be ductile and workable. We need a coin-metal, Channing, that cannot be counterfeited!"

"Yum. That's one for the book. Meanwhile, we'll retrench on Venus Equilateral and get set for a long, long drought."

"Check. I'm about to do likewise with Interplanet Transport. You don't know anybody who'd like to buy the major holdings in a spaceline, do you? It's on the market, cheap. In fine condition, too, in spite of the depredations of Hellion Murdoch."

"Might swap you a communications company for your spaceline, Keg."

Johnson smiled. "No dice. I'm looking for a specialized business, Don. One that will pay off in a world where there is no money!"

"What are you going to sell—and for what?"

"I'm going to sell security—for service!"

"So?"

"Those are items that your devil-gadget won't duplicate, Channing. But they're intangible. Barter and exchange on the basis of a washed-car's worth of dug postholes."

Linna Johnson looked up with some annoyance as Keg entered her room. She was a tall woman, lissome in spite of her fifty years, but the artificial stamp of the "woman-of-fashion" spoke louder than her natural charm.

"Yes?" she asked without waiting for salutation.

"Linna, I need a hundred and seventy thousand dollars."

"Remarkable. What do you want me to do about it?"

"You've got a quarter of a million tied up in baubles. I want 'em."

"Give up my jewelry?" scoffed Linna. "What kind of tramp deal have you got into this time. Keg?"

"No tramp deal, Linna," he said. "I've just sold the spaceline."

"So—you've sold your spaceline. That should have brought you in a pretty penny. What do you need more for?"

"I want to buy Fabriville."

"Who or what is Fabri . . . what-is-it?"

"Fabriville. A fairly large manufacturing village south of Canalopsis, here. They have a complete village, assembly plant, stores, and all that's needed to be self-sufficient if you permit a thorough income and outgo of fabricated articles."

"Never heard of it."

"Well," said Keg dourly, "there are a lot of things you have never heard of nor taken the interest to find out, Linna. Better shell out the baubles. They won't be worth an exhausted cathode inside of a year."

"Why?"

"The economic structure of the system is about to be shot to pieces in a box. Nothing will be worth anything in money. A diamond as big as your fist will be just so much carbon crystal. I want to butter us up, Linna, before the crash. That's the way to do it."

"What is this crash coming from?"

"Don Channing and Walt Franks have just developed a gadget that will transmit articles over any distance. That shoots Interplanet. The articles—or the signal-impulses from them—can be recorded, and the recording can be used to duplicate, exactly, the same thing as many times as you want it."

"You idiot," scorned Linna, "why not just get one and duplicate your present money?"

"Merely because an operator as large as myself cannot palm off two hundred one thousand dollar bills with the serial number AG334557990HHL-6. Counterfeiting will become a simple art soon enough, Linna, but until it is accepted, I'm not going to break any laws. I can't if I'm going to shove ahead."

"But my jewels."

"So much junk."

"But everything I have is tied up in jewelry."

"Still so much junk."

"Then we're bankrupt?"

"We're broke."

"But the house . . . the cars . . ."

"Not worth a farthing. We'll keep 'em, but their trade-in value will be zero."

"If we have no money," said Linna, "how are we going to pay for them?"

"Not going to. They'll pay for themselves. We'll send 'em back and keep duplicates which we'll make."

"But—"

"Look, Linna. Shell out. I've got to hit the market this afternoon if I'm going to grab Fabriville."

"Seems to me that getting that place is slightly foolish," objected Linna. "If nothing will have any value, why bother?"

"Oh, certain items will have value, Linna. That's what I'm working on."

"I still do not like the idea of giving up my jewels."

"If the junk is that important," exploded Keg, "I'll promise to replace them all with interest as soon as we get running."

"Promise?" whined Linna.

"Yes," said Keg wearily. "It's a promise. I've got to make an option-payment immediately. From then on in, the place will be mine."

"But if you gamble and lose?" asked Linna worriedly. "I'll lose my jewelry."

"I can't lose."

"But if the economic structure falls?"

"I can't miss. All I want to do is to get what I need before the bottom falls out. Inflation of the worst kind will set in, and the wheels will stop dead—except at Fabriville. That's where I enter the picture."

"Good," said Linna in a bored voice. "As long as I am assured of my jewelry, I don't care how you play the market. Run along, Keg. I've got a dinner engagement. May I have just a few, though? I'll feel naked without at least a ring."

"Take what you need," said Keg and was immediately appalled at the necessities of life.

An hour later, Keg Johnson was making some quiet trading and slowly but surely gaining control over the manufacturing village of Fabriville. The market was steady and strong. The traders worked noisily and eagerly, tossing millions back and forth with the flick of a finger. It was a normal scene, this work of theirs, and when it was done, they would take their usual way home to a quiet evening beside a roaring fireplace.

But this was surface quiet. Deep down below there was a miniscule vortex that churned and throbbed, and other, equally minute forces fought the vortex—and strove in a battle that was lost before it began.

Terran Electric bought a full page advertisement in every paper. A five-minute commercial assailed the ears from every radio that listened to the Interplanetary Network. A full column emerged from the morning news-facsimile machines. Terran Electric, it said, was announcing the most modern line of household electrical appliances. Everything from deep-freezers to super-cookers. Everything from cigarette lighters to doorbell chimes.

The prices they quoted were devastating.

But on page seventeen, hidden among the financial and labor-situation news, was a tiny, three-line squib that told the story to those who knew the truth. Terran Electric had just released sixty per-cent of their production-line labor.

Don Channing caught the squib, and headed for Evanston less than fifteen minutes after reading it.

Unannounced, Don Channing entered Kingman's office and perched himself on the end of Kingman's desk. His bright blue eyes met Kingman's lowering brown eyes in a challenge.

"Meaning?" asked Kingman.

"You utter fool," snapped Don. He lit a cigarette and blew a

RADAR ASTROGATION
ORBAN

cloud of smoke at Kingman, making the other cough.

"Am I?"

"You idiot. How long do you think this will last?"

"Not long," admitted Kingman. "But while it does, I'm going to get mine."

"What good will it do you?"

"Plenty. Until the crash comes, I'm laying in a stock of stuff for my personal use."

"Lovely set-up," grunted Channing. "Have you started duplicating the duplicating machines yet?"

"Just today."

"Don't do it, Kingman. Venus Equilateral has all the rights sewed up tight."

"What shall I do, Dr. Channing?" asked Kingman sourly. The title grated on Don's ears and Kingman knew it.

"Stop the whole thing."

"And what are you going to do about it?" asked Kingman. "Take me to court, Channing. Go ahead. Get some litigation started."

"Oh, sure. And you'll tie the thing up for seventy years. And all the time the plant here will be duplicating the whole solar system into the worst mess it ever got itself into. Better stop until we can get something sensible figured out to take care of the conversion."

"That in itself will take ten years," said Kingman. "Meanwhile, money is still of value because the thing is not widespread. People will buy and sell, and I'm going to buy up enough to keep me and mine in the running until things settle down. You have no idea how much stuff is needed to keep a man running for ten years, Channing. Especially when you try to store it all away at once. Oh, sure. Recordings. I know. I'm making them. Also making recordings of everything that I can think of that I might like. But getting the originals takes money at the present time, and I am going to ride the inflation market right up to the peak by being one step ahead all the way."

"How?"

"When butter is ten dollars a pound, Channing, I'll be producing and selling its equivalent at fifteen."

"Very nice picture, Kingman. But it doesn't work that way. You're licked."

"Am I?"

"You're licked. You'll be no better off than any of us in the long run. What happens when everybody has duplicators in their own homes and are having their Sunday dinner coming out of the gadget complete; hot, delicious, and costlessly complete from the saltcellar to the butter square? What price butter?"

"That'll happen," admitted Kingman. "But by the time it does, I'll be set to weather the storm."

"You make it sound very easy, Mark. But it isn't going to work that way."

"This is going to be a nice, level civilization by the time we get through it," said Kingman. "There'll be no more shopping for food. No more working thirty-five hours a week for your pay so that you can buy the niceties of life. With your household duplicator, you can make everything you need for life, Channing. The Terran Electric label on your duplicator is the label of the New Way of Living."

Channing snorted and crushed his cigarette out with a vicious gesture. "You've been reading your own advertising," he gritted. "Kingman, what do you hope to gain?"

Kingman leaned back in his chair and put both feet on the desk. "I don't mind telling you," he said, gloatingly. "Venus Equilateral is going to have the name of having invented and developed the matter transmitter and matter duplicator. That's fine. It will carry quite an honor, that reputation, up to the time that the big crash comes, when people realize that they're being trapped. Terran Electric, selling duplicators for home use at a song, will emerge as the savior of mankind. All I'm going to gain out of this is security for Mark Kingman and a big, black eye for Venus Equilateral."

Don Channing swore. He stood up. "You fool," he snapped, "you blind, bigoted fool. A little cooperation on your part would save a lot of trouble, but you prefer to let a petty quarrel ruin the entire economic system immediately. We could work this out sensibly, Kingman. Will you help?"

"No. Nothing you can say will convince me that I'm doing wrong."

"But why fire your help? That's what is going to hurt."

"I don't need a production line full of people, Channing, to sit around and watch a duplicator turn out vacuum cleaners, complete in their packing cartons."

Channing took Kingman's under ankle where they were crossed on the edge of the desk. He lifted, and the pudgy attorney went over backwards with a roaring crash, hitting his head on the carpet and spilling over backwards out of the chair onto the floor behind his desk. He arose with a roar of hate, but the door slammed behind Channing before Kingman could become coherent.

Channing returned to Venus Equilateral immediately, a trip that took four days. In touch with events by driver beam, Don heard the news advertising agencies announce the Terran Electric Duplicator of a size suitable for a medium home, complete with a recording attachment and a supply of disks. Channing gritted his teeth and stepped up the drive of the *Relay Girl* another notch. His first query upon reaching the Station was to Wes Farrell.

"Nothing yet, Don," answered Wes. "We've been running some very interesting experiments, though."

Channing was interested in nothing but the non-duplicatable material, but he nodded. Wes Farrell's sideline experiments often paid off more than the main line of research.

"By inserting a filter circuit in the transmission beam, we can filter out other responses," said Wes. "Meaning that we can take a cube of regular iron, for instance, and run it through. The integrated iron in the receiver is pure iron, the purity of which is dependent upon the band-pass of the filter. Using alloy selectivity disks for filters in the circuits, we can make iron that is 99.99997% pure."

"Might be useful for metallurgical work, and so forth," mused Don. "Nine-nines iron is valuable and almost impossible—and it takes a gadget that destroys value to make it. Nice paradox, that."

"Another thing," said Wes. "We re-transmit the pure iron, and heterodyne the impulses into other elements. We can start with iron and end up with any of the other elements, merely by introducing the proper heterodyning impulse."

"That's not bad."

"I've got several elements that start off where the Periodic Chart ends. The boys in the chemistry lab are investigating the properties of Venium, Channium, Frankine, Ardenium, and Farrelline right now."

"Who picked the names?" grinned Don.

"Arden."

"O.K., Wes. But keep looking for that non-reproducible substance."

"I will. It may be—"

Farrell was interrupted by the insistent call on the Station intercom for Don Channing. Don went to his office to find the Terran beam awaiting his presence. He lifted the phone and identified himself.

"This is P. L. Hughes of the Interplanetary Criminal Office," came the answer.

"I didn't do it," grinned Channing. "Besides, I gotta alibi."

"O.K.," came the amused answer. "No use talking then."

"Just a minute," said Don. "I might as well know what I'm being suspected of. Whom have I murdered?"

"No one, yet. Look, Channing, we're having a time here."

"What kind?"

"Phony money."

"So?"

"Yes. The trouble is that it isn't phony. You can always detect spurious coinage and counterfeit bills by some means or another. We have bits of nita-fluorescin in the bills that is printed into the paper in a pattern which is symbolically keyed to the issue-date, the serial number, and the identifying marks on the face of the bill. It takes a bit of doing to duplicate the whole shooting-match, but we've been getting stuff that we know is phony—but, Channing, having the original and the duplicate here on my desk I can't tell which is which!"

"Give me more."

"I have a hundred dollar bill here—two of them in fact. They are absolutely alike. They are both bona fide, as far as I or my men can tell from very complete analysis, right down to the bits of stuff that gets ground into a bill from much handling. I have coinage the same way. Isn't there something that can be done?"

"We are trying to find a substance that can not be duplicated," explained Channing. "Given time, we will. Until then, I'm helpless."

"What do you suggest?"

"I don't know. I've been hoping that we could control the situation until something sensible could be worked out. It slipped out of hand. I'd suggest that you stop operations because of the absolute impossibility of keeping your thumb on things. I'd forget the counterfeiting angle entirely and start building up a force to guard against riots, mob rules and minor, intercommunity warfare."

"I think you're right," said Hughes, and Channing knew that the head of the Interplanetary Criminal Office was nodding his head..

Channing hung up the telephone and toyed with three copies of the judge's watch that were keeping identical time. He shook his head and wondered how it was all going to end.

Conversion from production line to duplicator came all over the Solar System in about ten days. Terran Electric's own staff fabricated a duplicator capable of handling an object the size of a locomotive, and plant-sized duplicators were formed, one after the other on flat cars that rolled through the maw of the huge machine. For payment, Terran Electric accepted blocks of stock in the purchasing companies, and the wealth and holdings of Terran Electric mounted high and began to look like the major company that would ultimately control all merchandising and manufacture in the System.

And thirty days after the conversion came, the wheels ground to a stop. Industry was finished. Work had ceased. Plants lay idle, nothing to do—and no one to do it for them.

Keg Johnson looked up as Linna entered. There was a worried look on her face that caused Keg to inquire immediately as to its cause.

She tossed a diamond bracelet on his desk and snorted: "That!"

Keg picked it up. "Looks all right to me," he said. "Like the real article. What's wrong with it?"

"Nothing that I can tell," grumbled his wife. "Excepting that my maid has one like it, exactly."

"I'm not too surprised," laughed Keg. "I've been warning you of that."

"But what's the world coming to? If my maid can afford a diamond bracelet like this, she won't be working for me very long."

"At that, you're probably right. I'd treat her with the most delicate of care," said Keg.

"She's my maid!"

"Look, Linna. You're not up-to-date. I can predict people sleeping in gold beds and eating from solid platinum dishes before the hysteria dies out. The economic set-up has gone to pot, Linna, and we're trying to work it out."

"But what's the world coming to?"

"It isn't a matter of what it is coming to, it's a matter of where it has gone. As best as my technicians tell me, metals will be rated in value as per their atomic number. Uranium is more expensive than lithium because the transmutation-factor is higher. It takes a little more power and more matter from the matter bank in the instrument to make uranium than lithium, ergo uranium will cost more."

"Then if this diamond bracelet is worthless, can't we get some uranium jewelry?"

"Sure—if you want it. But remember it is radioactive and therefore not to be worn too close to the skin. It isn't as bad as radium, for instance, but it is bad enough. Besides, Linna, the matter of uranium's value over lithium is a matter of a few tenths of a percent."

"Um. And how much is a pound of uranium worth, these days?"

"In Terran dollars, about forty-seven million, six hundred and fifty-two thousand, three hundred and eight."

"Are you kidding?" demanded Linna. "How can Marie afford—"

"Linna, dollars are worthless,

these days. Monetary holdings are valueless. Stocks and bonds are likewise useless. Interplanet isn't shipping a thing. Terran Electric isn't selling anything. Venus Equilateral is handling sentimental messages only, and they'd be running at a loss if it weren't for the fact that they're out in space where power comes from Sol."

"But what is going on?"

"The death of an economic system."

"But why? Keg, you know I've never questioned your ability. You have always enjoyed the run of big business. Whenever I've needed or wanted anything, it has been available. I write checks and never question the balance. But this has me stopped. What has happened, specifically?"

"Channing and Franks invented a gadget that will reproduce anything."

"It is just that?"

"That and only that," said Keg.

"But it seems to me that this would make everybody live in a world of plenty."

"It will. That's why we'll have people sleeping in solid gold beds and enjoying solid silver plumbing. Platinum will have no more value than a slab of lead of the same weight. You see, Linna, when they can duplicate anything—in quantity—it includes money, stocks, bonds, and jewelry as well as radio receivers, automobiles, refrigerators, and table lamps. No one will take one dime's worth of money because it is valueless. Why should I sell my fountain pen for fifty dollars when I can make fifty dollars by pushing a button—or the other guy can make a fountain pen by pushing a button? Follow?"

"But the public utilities? What of them?"

"That's the cinder in the eye, Linna. Somebody's got to work!"

"Well, I've heard it said that somebody will like to do everything—someone will find pleasure in digging latrines if you look for him long enough."

"Not good enough. Barney Carroll likes to tinker with radio. He's good, too. But it is a hobby, and Barney's tinkering will not produce anything like a commercial receiver. Oh, it'll work, and as good as any set, but no one would have the thing in the living room because it has no artistic appeal. But say it did. Fine. Then what about the automobile boys? Has anyone ever tried to make his own automobile? Can you see yourself trusting a homemade flier? On the other hand, why should an aeronautical engineer exist. Study is difficult, and study alone is not sufficient. It takes years of practical experience to make a good aeronautical engineer. If your man can push buttons for his living, why shouldn't he relax?"

"But what are we going to do?"

"Linna, I bought this place so that we could work it out. There is one thing that cannot be duplicated."

"Yes?"

"Service."

"Meaning?"

"You can't machine-clean the house. You can't machine-invent new gadgets. You can't machine-write books, music, or moving pictures. You can't machine-maintain machinery. You can't machine-doctor a burst appendix. And so forth. You can duplicate the antiques until they have no value. Rembrandt is going to be a household word. The day of the antique is gone, Linna, and the eventual trend will be to the *unique*. Mark my words, there will some day be unique shops that deal in nothing but items which they can certify as never having been duplicated."

"But if service is of value," said Linna doubtfully. "How am I going to get along?"

"You'll be of service," said Keg harshly, "or you'll not get along."

"So?"

"Look, Linna. You're my wife. As my wife, you've been spoiled. That's my fault. I liked to spoil you. In the early days I couldn't spoil you because we were in no financial position to do any spoiling, but now you've become a parasite, Linna. You and your dinners and your jewels and your cars and your sleek, vacuum-brained friends. Patron of the arts! Nuts. Bum poetry, slapdash canvases, weird discordant music. No, it's not entirely your fault. I've sponsored it because I thought it gave you pleasure.

"But we're all on the same level now," he continued reflectively. "No one is any better than his brains. I've been graced. It has been my very lucky lot to be in a position where I can sway men to my will. Fabriville is mine—and yet it belongs to every man in it equally. I can't get along without them, and they can't get along without Fabriville."

"But how is it going to work out?"

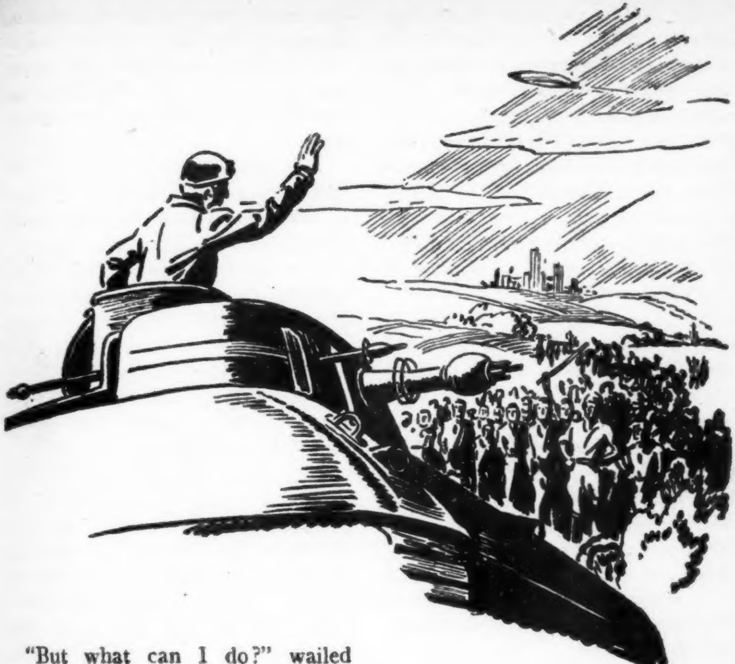
"I don't know. It is tough. We have three physicians and two surgeons and a couple of high-powered diagnosticians. The question is this: How much time should Mrs. Jones demand of Dr. Hansen? She has a bit of rheumatism. Larkin, on the other hand, has a bad case of gallstones. Obviously, these two must not enjoy equal call upon Doc Hansen. Furthermore, these two must not be expected to pay the same figure."

"Pay the same figure?"

"In service, Linna. The board of strategy sits for several hours each day deciding things like this—and it is not simple. How many hours of gardening is worth removing gallstones? And what happens to Doc Hansen when he has seventeen gardeners, four butlers, nine chauffeurs, fifteen cooks, and twelve of each of the rest?"

"Um. I see."

"But how do we tackle it? Until someone gets a medium of exchange, we're forced to go on the barter-and-trade basis. Fabriville will toss out anyone who isn't paying his way by working. In return, he has free call upon the market, the manufacturing center, and the professionals. Thank God that hoarding is silly in a realm of ultra-plenty."



"But what can I do?" wailed Linna.

"Help. Go out and help in the hospital."

"But I'm your wife."

"So what?" said Keg flatly. "I'm working. I get no more for this than Joe Doakes, who is out there painting the flagpole."

"But—"

"Sure. I like to do this. But Joe Doakes always wanted to run up a flagpole on a bosun's chair and paint it. We're exactly even. At least in Fabriville, we aren't going without anything. Eventually the rest of the worlds will fall in line and there will be enough of stuff for everyone, but until that time arrives, we'll be seeing trouble."

"The rest of the worlds?"

"There'll be riots and small-town wars. I only hope we can get our fence up before they decide to call on us."

"You've sort of created an oasis here," said Linna. "But how long will it last?"

"Until Channing and Franks come up with some substance that can not be run through their own duplicator. I hope it will not be too long."

Out in the Trojan Position ahead of Venus, the famous Relay Station better known as Venus Equilateral moved in its quiet way. Like Fabriville, Venus Equilateral was self-sufficient. Furthermore, Don Channing had declared a closed corporation, and the three thousand inhabitants of the relay station were all in accord.

Business was running low. Yet the salaries went on, even increased, while prices went dropping to ridiculously low levels.

With a closed system such as Venus Equilateral, such an artificial economy was possible by mere basic control. The crime angle was nil on Venus Equilateral. With three thousand people living in a cylinder of steel three miles long and a mile in diameter, crime and general nastiness were eradicated by the simple means of making it too hard to conduct anything illegal. The citizens of Venus Equilateral were patriotic to the nth degree.

So the situation was less strained than in Fabriville. Though work moved slowly, there was still more than plenty for everyone, and the people were satisfied.

They were an unsuspicious lot, and so they did not think it off-color when a small spacecraft of the plutocrat class came circling up to the South End landing stage. The craft landed, and a tall, broad-shouldered man emerged and asked for Channing. He was escorted along a mile of car-way in the outer skin of the Station and then whipped up towards the center of the Station for five hundred feet. He was led along the broad corridor and shown the main office of the Director of Communications.

Don Channing's secretary opened the door and said: "A Mr. Laurus Towle to see you, Dr. Channing."

Don nodded.

Towle entered behind the girl, who introduced him to Don and to Walt Franks. Then she left.

And as the door closed, Towle whipped out a revolver and pointed it at Channing. Walt slid forward off his chair and brought the chair around over his head with a single, flowing motion. Towle ducked the thrown chair, faded backwards, and fired at Don.

The shot pinged against the steel wall, flaking off some of the plastic covering. Don dropped to the floor, and came up with his wastebasket, which he hurled at Towle. Towle ducked, fended it aside with his left hand, and tried to level the gun again. Walt Franks reached into an open file drawer and grabbed a large handful of papers, which he threw at Towle. They fluttered and filled the air for a moment, which distracted Towle long enough for Channing to leap over the desk.

Don and Walt closed on Towle in a high-low tackle, Don jumping at Towle's head and shoulders from the desk top while Franks hit Towle sidewise at the thigh-level in a crashing tackle. They rolled over and over and Towle lost his revolver.

The papers were still fluttering to the floor when they came to rest with Towle neatly squelched beneath Channing and Franks.

Towle tried to heave them off. Don almost knocked Towle's jaw loose with a stinging backhand slap. "Don't try," snarled Don. "You're mad—right now!"

"You stinking—"

"Shaddup," growled Channing. "And start explaining what this is for."

"I'm ruined!"

"Try it again and we'll ruin you some more," promised Don. "I have an aversion to being shot at."

"So have I," said Walt.

"He wasn't shooting at you," said Don.

"No, but I'd have been next, wouldn't I, Lazarus?"

"Laurus," snarled Towle.

"Now look," said Channing in a voice that gave no idea of softness, "you're licked from here on in. This weapon of yours is now ours, and we'll hang it in the museum with other mementos of our having been shot at. Luckily, this makes the first time that it came close. Say—you aren't an old crony of Hellion Murdoch?"

"Never heard of him."

"Good. Now, as I was saying, we've disarmed you. . . . Walt, take a prowl of his person and see if he has any more lethal instruments concealed thereupon . . . and we're inclined to get up off the floor and resume our roles as gentlemen. Besides, I want to know what you had in mind besides assassination."

They lifted the man from his supine position and planted him roughly in an overstuffed chair. Don and Walt sat on one edge of the desk, ready to move in with the first wrong move. Don snapped the communicator and spoke to the girl outside. "Mr. Towle had a little trouble with an exploding cigar, Lorraine. No one need enter."

"Now," he said to Towle, "precisely what gives?"

"I'm ruined."

"Yup. You are. But why?"

"You ruined me."

"Me?" asked Channing. "Not that I know of."

"I'm bankrupt."

*"Bankrupt?"* laughed Channing.

Towle bristled at the laugh. "It's no laughing matter, Channing. For most of my life I've been saving to retire. In the turn of a wrist, you have made all my savings useless."

"Are you starving?"

"No."

"Are you homeless?"

"No."

"Are you being deprived of anything?"

"Um—no."

"Then what's all the shooting for?"

"But my savings?"

"Look, Towle. You worked hard for them, I do not doubt. But you've got just what you wanted anyway. You have a duplicator?"

"Of course. I bought it early."

"Good. Then use it and quit worrying about your savings."

"But the years of deprivation to build up that fortune."

"Tough," said Channing. "I suppose you're mad because the foolish grasshopper is now enjoying the same benefit as the ambitious ant. That's not right, I suppose. But on the other hand, why should any man be a slave to toil?"

"Man shall earn his bread by the sweat of his brow."

"Baloney. Next you'll be telling me that men were better off with a ten-hour day and a six-day week."

"They didn't seem to get into trouble as much."

"Nor did they have as much fun," said Channing. "Nor were there as many developments made in the fields of science and industry. Men slaved and worked and lived and died without ever seeing the pleasure of the country sky. The radio would have been useless without leisure to enjoy its offerings. And who will say that radio is a useless science?"

"But it is not right that I should have slaved to acquire a retirement fortune only to see it wiped out."

"Look, Towle, the whole system is undergoing a radical change in the economic structure. By the same token, Venus Equilateral is a ruined concern. We've dropped from ten million paid messages per day to a mere handful. Those we send through because we are bound by agreement to maintain service at all costs. We aren't making expenses, if you feel like hollering about money. Would you like a few million?" asked Channing suddenly.

"I have—"

"And you used your duplicator to run up your fortune first thing, didn't you?" asked Channing scathingly.

"Naturally."

"And you're sore because every one else did the same thing. Towle, you're a dope. You've been feeling very virtuous about having worked like a slave for your fortune, which would probably keep you in cakes and lodging for the rest of your life. You've been promising starvation and pauperism to anyone who bought anything that seemed the slightest bit frivolous to you. Now that the ax has slipped, you're mad because the guy who liked to ramble amid the roses is not going to starve to death as per schedule. What's wrong with you? You're not going hungry. You'll be better off than before. As soon as we get this mess ironed out, you'll be able to enjoy life as before. Your savings are safe. As soon as we get a medium of exchange that works, you'll be credited—the government took care of that as soon as the bottom fell out of the monetary system. Call 'em dollars, credits, or whathaveyous, they'll all be prorated and you'll then enjoy your fortune—though it won't be as much fun because no man is going to have to slave again. You're a crazy man, Towle, and as such I'm sending you back to Terra under guard. We'll let the psychologists work over you. Maybe they can make you behave."

They stood Towle up, rang and

waited for a guard, and then saw the man off under the guard's eye.

And Don Channing said to Walt Franks: "Until we find a medium of exchange, there'll be the devil to pay and no pitch hot."

Walt nodded. "I'm glad we're out here with our little colony instead of where lots and lots of people can come storming at the gates demanding that we *do* something. Hope Keg Johnson is holding his own at Fabriville."

It was a growling mob that tramped across the desert towards Fabriville. A growling, quarreling mob, that fought in its own ranks and stole from its own men. A hungry, cold, and frightened mob that followed a blustering man named Norton, who had promised them peace and plenty if they did his bidding. His law did not include sharing among themselves, and so men fought and stole food and clothing and women.

Had the mob been anything but a shaggy, travel-weary band, Fabriville might have been wiped from the map of Mars.

It swept forward without form and like an ocean wave, it laved against the cyclone fencing that surrounded that part of Fabriville and was repulsed. A determined, well-fed band would have crushed the fencing, but this was a dispirited mob that would have sold its leader for a square meal and would have worked for the promise of a second meal in a row.

Keg Johnson came to the edge of Fabriville in a medium-sized tank that could withstand the entire mob to the last man. He ran the tank out of the gate and right to the edge of the mob, who shrank back to permit the thundering monster to pass. He stopped the tank and stood up in the top turret and spoke.

A built-in amplifier carried his voice to the edge of the mob.

"Who is your leader?"

Norton came forward boldly. "I am."

"What do you intend?"

"We want a haven. We are cold and hungry and needy."

Johnson nodded. "I can see that," he said dryly. "How did you collect this gang?"

"Most of this outfit were caught in the crash. Their incomes did not permit them to buy duplicators, and their friends were too busy running up their money to bother handing any out."

"Fine friends."

"And in the smaller cities, the attendants at the power stations left. There are a horde of dead towns on Mars today. That is why we have come here. We know that Fabriville is self-sufficient. We intend to join you."

"Sorry," said Keg. "We have no openings."

"We'll join you by force, if need be."

"Want to try it?" asked Keg, patting the twin 105-mm. short rifles that looked out over the mob.

No answer for a moment.

"I'll try appealing to your better nature," said Norton softly.

"Shall we starve and shiver while Fabriville eats and is warm?"

"How willing are you to take part?" asked Keg.

"Name it."

"Then listen. We need a more sturdy fence around Fabriville. We have the material—who hasn't—but we have not the manpower. Get your mob to run up this fence, Norton, and I'll see that you are paid by giving each and every man a house-hold-size duplicator complete with a set of household recordings. Is that a deal?"

Norton smiled wryly. "And what good is a duplicator with no place to plug it in? The power stations are down all over Mars."

"In building this fence," said Keg, "you are working out the value of the duplicators. Now look, Norton, in order to make this thing tick, I want to know whether you and your motley crew are honest. There are enough of you to man every vacant power station on Mars. If you, as leader of this gang, will see to it that the stations are manned and running every minute of the day, I'll see that you are given the benefits of Fabriville's more massive duplicators. That means fliers, and equipment of that size, Norton. Are you game?"

"What are you getting out of this?" asked Norton suspiciously.

"No more than you. I can eat only so much. I can wear only so much. I can use only so much. But it is my pleasure to run things, and I like to do it. Therefore I shall run things until people decide that they want another man to run things. Until that date, Norton, you'll answer to me."

"And if I do not kowtow?"

"You don't have to. No one is going to kill you for spitting in my eye. But if you have sense, you'll see that working my way will ultimately bring you more reward than going on as an unruly mob. Replace me if you can, Norton, but remember that it cannot be done by force. I have too many real friends out across the face of Mars who won't let me be shot to pieces. I've done them the same service I'm doing you. Take it or leave it."

"Why can't we remain?"

"We have thirteen thousand people in Fabriville. To take on another ten thousand would complicate our work-system to the breaking point. We're running perilously close to chaos as it is, and we couldn't take more. If you'll set up the power stations and start small communities at these points, you'll all be better off."

"And what do I get for all this?"

"Nothing. You'll be fed and clothed and housed. That's all that any of us are. Men out there are all the same, Norton. No one has a dime. They're all bankrupt. There isn't one of them that can buy a thing—even if the stores were open. But not one of them is starving, not one of them is going unclothed, and not one of them is going without the luxuries of life, except for those communities of which you speak. Take life to them, Norton, and you'll be the ultimate gainer."

"Why do they remain?" wondered Norton.

"The duplicator will run on direct current," said Keg. "They just have a set of fully charged batteries recorded. They have a set in spare. When battery one runs down, battery two takes its place and the first thing run off is a spare battery number three, and so on. The exhausted batteries are dumped into the matter bank and re-converted. But it is not a real luxury, running on batteries. They need the high power that your stations will deliver. They need the telephone and the radio which your men can maintain. Go and seek the officials of the various companies, and tell them what you want to do. Work at it, Norton. There will be a lot of men in your gang that would rather do something else. Eventually you will be able to release them to do the jobs they are best fitted for. Until we get a medium of exchange, it is a job for job proposition. I'll add this inducement: The medical service of Fabriville is yours—providing that you and your men work with us."

Norton thought for a moment. "Done," he said shortly. "Can you give us warmth and food until we take care of the details?"

"That we can."

A stilted monster rolled out from Fabriville under its own power. Four great girdered legs supported a housing the size of a freight car, and the legs moved on small tractor treads. Out it came, and it paused just outside of the gate. A faint violet glow emerged from the bottom of the housing, and the whirling-skirling of Martian sands obscured the vastness of the space between the legs of the monster machine.

It moved again, and the original dust settled to disclose a very small but completely finished and furnished house. Around the encircling fence went the monstrous duplicator, and at each pause it dropped the carbon copy of the original house. Hour after hour it hummed, and when it completed the circle, Norton's mob was housed, fed, and clothed.

Venus Equilateral resounded and re-echoed from the force of the blast. It rocked, and precession tilted it away from its true North and South axial positioning. Men raced along the car-way to the blister laboratory and Channing led the wild rush.

The blister was gone. A shaken Wes Farrell clung to a stanchion, his face white behind the space-suit mask. They fished him out of the wreckage and took him inside.

"What happened?" asked Don.

"Was making artificial elements," explained Wes. "Far outside of the Periodic Chart. I'd been stacking them over in a corner—they come in six-inch cubes, you know. But the last one—*Bang!*"

Channing shook his head. "That's dangerous," he said solemnly. "If you had a six-inch cube of every known element.

would you stack 'em all side by side?"

"It might be all right—until you came to putting phosphorus on top of a hunk of iodin," said Walt.

"There's no reason to suppose that Wes didn't get a couple of very active elements side by each. We know nothing of the extra-charted elements. We can make 'em, but until we do, what can we know of them?"

"Well, we didn't lose the Station," said Walt. "And business is so punk that tossing the beams won't harm us much; we'll have to spend some time aligning the place again."

"We're all here, anyway," agreed Don, looking over the ruined blister laboratory. "But look, Wes, I think you're running on the wrong gear. Anything that can be made with this gadget can be duplicated. Right?"

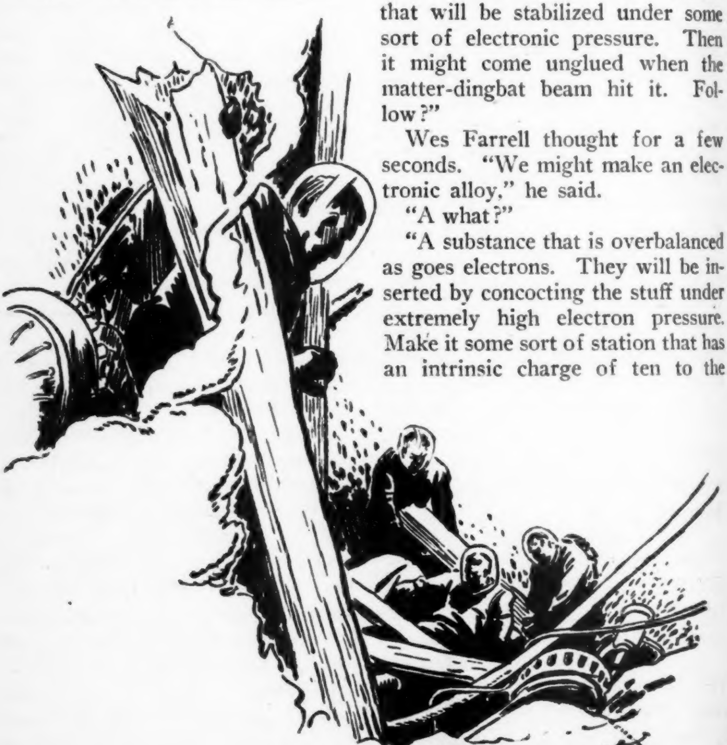
"I guess so."

"What we need is a substance that will be stabilized under some sort of electronic pressure. Then it might come unglued when the matter-dingbat beam hit it. Follow?"

Wes Farrell thought for a few seconds. "We might make an electronic alloy," he said.

"A what?"

"A substance that is overbalanced as goes electrons. They will be inserted by concocting the stuff under extremely high electron pressure. Make it some sort of station that has an intrinsic charge of ten to the



fiftieth electron volts, or so; that'll make queer alloys, I'll bet. Then it can be stabilized by inter-alloying something with a dearth of electrons. The two metals will be miscible, say, when liquid, and so their electron balance will come out even. They are cooled under this stress and so forth. When the disintegrator beam hits them, it will liberate the electrons and the whole thing will go plooey."

"Looks like a matter of finding the right stuff," said Walt. "Don, what about running the Station charge up as Wes says?"

"No dice. The Station is too big. Besides, the chargo-changing gear would be overworked all over the Station to maintain the charge, once made.

"Take the *Relay Girl* out and try it, Wes."

"Come along?"

"We don't mind if we do," grinned Walt, winking at Don. "There'll be nothing didding about business until we get a medium of exchange."

The Reverend Thomas Doylen speared Keg Johnson with a fishy glance and thundered: "A plague on both your houses!"

Johnson grinned unmercifully. "You didn't get that out of the Bible," he said.

"But it is none the less true," come the booming reply.

"So what? Mind telling me what I'm doomed to eternal damnation for?"

"Sacrilege and blasphemy," exploded Doylen. "I came to plead with you. I wanted to bring you into the fold—to show you the error of your sinful way. And what do I find? I find, guarding the city, a massive gate of mother-of-pearl and platinum. Solid gold bars on the gates which swing wide at the approach. A bearded man in a white cloak recording those who enter. Once inside—"

"You find a broad street paved with gold. Diamonds in profusion stud the street for traction since gold is somewhat slippery as a pavement. The sidewalks are pure silver and the street-stop lights are composed of green emeralds, red rubies, and amber amethysts. They got sort of practical at that point, reverend. Oh, I also see that you have taken your sample."

Doylen looked down at the brick. It was the size of a housebrick—but of pure gold. Stamped in the top surface were the words:

"99.99% pure gold. A souvenir of Fabriville."

"What means all this?" stormed the reverend, waving the brick.

"My very good friend, it is intended to prove only one thing. Nothing — absolutely nothing — is worth anything. The psychological impact of the pearly gate and the street of gold tends to strike home the fact that here in Fabriville, nothing of material substance is of value. Service, which cannot be duplicated, is the medium of exchange in Fabriville—have you anything to offer, reverend?"

"The Lord saith: 'Six days shalt thou labor—' You have destroyed that law, Johnson."

"That's no law. That's an admonition not to overdo your labor. He didn't want us laboring seven days per. If He were running things under the present set-up, He'd be tickled pink to see people taking it easy five days per week, believe me."

"Sacrilege!"

"Is it? Am I being sacrilegious to believe that He has a sense of humor and a load more common sense than you and me?"

"To speak familiarly—"

"If I've offended Him, let Him strike me where I stand," smiled Keg.

"He is far too busy to hear the voice of an agnostic."

"Then He is far too busy to have heard that I mentioned Him in familiar terms. What is your point, reverend? What do you want?"

"A return to religion."

"Good. Start it."

"People will not come to church. They are too busy satiating themselves with the worldly goods and luxuries."

"Your particularly, private sect, like a lot of others," said Keg Johnson harshly, "has been catering to the wishful-thinking of the have-nots. That used to be all right, I suppose. You gave them hope that in the next life they could live in peace, quiet, and also luxury, believe it or not. You call down the troubles of hell upon the shoulders of the ambitious, and squall that it is impossible for a rich man to get ahead in heaven. Nuts, reverend. You've been getting your flock from people who have no chance to have the pleasure of fine homes and good friends. You've been promising them streets of gold, pearly gates, and the sound of angelic music. Fine. Now we have a condition where people can have those — worldly goods — luxuries right here on earth and without waiting for death to take them there. If you want to start a return to church movement, reverend, you might start it by making your particular outfit one of the first to eschew all this palaver about streets of gold. Start being a spiritual organization, try to uplift the poor in spirit instead of telling them that they will be blessed because of it. Don't ever hope to keep your position by telling people that material made with a duplicator is a product of Hell, Devil, & Co., because they won't believe it in the first place and there won't be anything manufactured by any other means in the second place."

"And yet you have all of Mars under your thumb," scolded the Reverend Thomas Doylen. "Of what value is it to gain the whole world and lose your soul?"

"My soul isn't in bad shape," responded Keg cheerfully. "I think I may have done as much toward lifting civilization out of the mire as you have."

"Sacril—"

"Careful, reverend. It is you that I am criticizing now, not God. Just remember this, people are not going to fall for a bit of salving talk when they want nothing. You promise them anything you like in the way of fancy embroidery, but they'll have it at home now instead of getting it in heaven. Give 'em something to hope for in the way of greater intelligence, or finer personality, or better friends, and they'll eat it up.

"As far as having all of Mars under my thumb, someone had to straighten out this mess. I gave them the only thing I had worth giving. I gave them the product of my ability to organize; to operate under any conditions; and to serve them as I can. I'm no better off than I would have been to sit at home and watch the rest run wild. They'd have done it, too, if there hadn't been a strong hand on their shoulder. Where were you when the bottom fell out? Were you trying to help them or were you telling them that this was the result of their sinful way of life?"

The reverend flushed. "They wouldn't listen to my pleas that they forsake this devil's invention."

"Naturally not. Work *with* this thing and you'll come out all right. But you've got to revise your thinking as well as the rest of the world has had to revise theirs, or you'll fall by the wayside. Now good day, reverend, and I wish you luck."

"Your argument may have merit," said the reverend, "though it is against the nature of things to fall in with any scheme without considerable thought."

"Think it over, then, and see if I'm not correct. I don't expect any immediate change, though, until you find that your former doctrines do not fit the people's wants now."

The reverend left, and as the door closed, a wave of pain swept through Keg Johnson's body. He reached for the telephone painfully and put a call through for the doctor.

"It's here again," he said.

"O.K., Keg. You're it."

"I'm licked, all right. Can I be back in seven days?"

"Make it three days with no mention of work. In five days you can have official visitors for three hours. In seven you may be up and around the hospital. You'll not be back there for eleven days."

"I'll have to put it off."

"Put it off another day and you'll not be back at all," snapped Dr. Hansen. "Take it or leave it!"

"How do I pay?"

"We'll take it out of your hide," said Hansen. "You're under the same rules as the rest of us. You do your day's work, and you receive the same medical blessing. Do you want to hoe the garden or will you wash my car?"

"I'll wash the car."

"That's what you say. Get over here in an hour—and bring Linna with you."

"What for?"

"Someone's got to drive—and it shouldn't be you!"

"That an order?"

"Nothing else but. Official order from the medical council. You'll play or else we'll have an interne take out that appendix."

Keg realized the sageness of the doctor's order by the time he reached the hospital. He was doubled over with pain and they did not permit him to walk from the car to the front door, but came out and got him on a stretcher. He was whisked inside, leaving Linna to straighten out the details at the Incoming desk.

He went up to the operating room immediately, and the anaesthetic blacked him out and released him from both pain and consciousness.

The days that followed were hazy; they kept him drugged because his energetic nature would have prevented rapid healing. And it was four days after the operation that they gave him a quick shot of counter-drug that brought him out of the fog immediately.

There were people there.

Don Channing, Walt Franks, Wes Farrell, and Dr. Hansen.

"Hello," he said, looking up with a wry smile. "How many car-washings do I owe you?"

"Plenty, brother. I tinkered for three hours over that frame of yours. Why did they have to run through an engineering change when they got to hanging your appendix in? I had to dig for it."

"That's the trouble with this system," Keg mumbled to Don. "He'll get the same credit for tinkering with me as he would for removing the cat's appendix."

"Well, you're worth the same as any cat," grinned Walt.

"Thanks," grunted Keg. "Don't tell me that you guys were worried?"

"Nope. We came to give you a hunk of something interesting. Wes Farrell hauled it out of space, electrons, and considerable high-powered theory. *Identium.* Corrosion-proof, inert, malleable but hard enough for coins, and you can roll it out into ten-thousandths sheets and use it for paper money. But don't ever put it into a duplicator. It'll blow the top right off of your roof if you do. There's our medium of exchange, Keg."

"Now," breathed Keg, "we can all get back to normal. Thanks, fellows."

"The government is making the stuff in reams," said Don. "It won't be too long before you'll be able to pay Hansen what he's really worth, as well as the rest of your crew. But in spite of this trinket, Life has still made a big change. I can foresee the four-hour week right now."

"It's here and been here for some time," said Keg. "But—Hey! Linna!"

Keg's wife entered. She was clad in hospital whites and was carrying a tray.

"Hello, Keg," she said solemnly. Keg hadn't heard that tone of voice for years.

"What happened?" he asked.

"Someone had to help. I was doing nothing and so I pitched in to help Dr. Hansen when he worked on you. He said I did fine."

"Linna is a good nurse's aid," responded Hansen. "Mind if we keep her on a bit?"

"Not if she minds staying."

"I want to, Keg," she said quietly. "With Marie wearing a platinum-mounted diamond tiara to dust the house, and Briggs coming to work in a limousine—imagine the idea of a butler's chauffeur!—and as you said, people eating from gold plates and using iridium tableware, there's nothing to get long-nosed about but one's inventiveness, talent, or uniqueness."

"Linna, you're an ace," grinned Keg. He smiled up at her and said, while waving the sheet of Identium before their faces, "Do me a job, Linna. Go out and buy me back the spaceline."

"Huh?" blurted Channing, Franks and Hansen. "What for?"

"When the tumult and the shouting dies, fellers, we'll all be back in business again. Identium! The only thing you can write a contract on and not have it fouled or duplicated. The only thing you can write a check on, or use for credit. Identium—the first page of the new era—and when we get the mess cleared up Keg Johnson and company will be carrying the mail! Linna, go out and buy me back my spaceline!"

THE END.

## IN TIMES TO COME

Once in a while this little department has something to announce, something over and above the usual indications of what's up for next month. This is one of the onces.

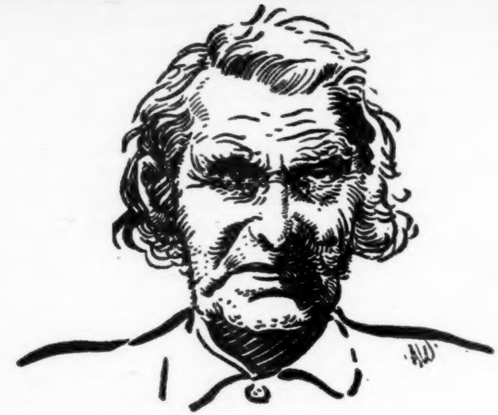
George Smith and Ted Sturgeon were visiting out at the house the other evening. I'd just gotten, and brought home still unread, a manuscript of a novel I'd been expecting. After considerable and varied discussion, I read the first few pages of that yarn aloud about 11 p.m. just before going to bed—so I thought. It's a van Vogt novel. You know van Vogt's trick of putting fishhooks in the first few paragraphs—they go in easily, but you can't back out; you have to go all the way through. "Slan" started that way. This one did—with interest, fervor and zeal. Well and securely hooked, we passed pages down the line. I finished the yarn at about 5 a.m., with Sturgeon and Smith a few pages behind.

Of course, such things are matters of personal taste, and the way things appeal to your own personality, so I can't make any binding promises beyond this one; there are going to be great and long-enduring arguments as to whether "Slan" or this new novel—one hundred thousand words—is the better. The three who have read it so far are fairly well agreed; "Slan" was a good story, but van Vogt's learned more about writing since then. This one is something like a 550 volt A.C. power line; it looks innocent, but once you get hold of it you can't let go till somebody shuts off the power.

This is fair and sufficient warning. It will appear in the August, September and October 1945 Astoundings. You have time to make certain of those numbers. Due to paper shortages, newsstands are inadequately supplied, a fact we regret but can't help. Even if you have to go to the extreme of actually doing what you've been sort of meaning to for years—entering your subscription—I'd advise it. Van Vogt's got a story. I think most of you know me well enough to know I'm not given to extravagant and unmerited advance encomiums.

This is one of the super-stories.

THE EDITOR.



# Heir Apparent

### by A. E. VAN VOGT

***Handing** over a planet-wide empire to a successor is not a thing to be undertaken in a day or two—normally. But the old ruler had four-day poison in his veins—and his heir might be the poisoner. And a revolution on his hands. And—problems!*

Illustrated by Williams

It was an uneasy, all-pervading sensation, a threat of pain to come combined with the beginning of the pain itself. The old man saw that Dr. Parker was looking at him startled.

"Good heavens, sir," the physician said. "You've been given Blackmail poison. This is incredible."

Arthur Clagg sat very still in the bed, his eyes narrowed, his thought a slow pattern of reception to impression. His gaze took in the chunky, red-faced Parker, the enormous bedroom, the shaded windows. At last, grimly, he shook his shaggy old head, and said:

"When will the crisis come in a man of my age?"

"About four days. The development is progressive, and the pain increases hour after hour by infinitesimal increments to a pitch of completely—"

The doctor broke off in a thin-lipped fury: "This is the worst crime in the history of the world. Poisoning a man ninety-four years of age. Why, it's—"

He must have noticed the scornful quality of Arthur Clagg's gaze. He stopped. He looked abashed. He said:

"I beg your pardon, sir."

Arthur Clagg said coldly: "I once defined you, doctor, as a person with an adult mind and the emotional capacity of a child. It still seems to fit."

He paused. He sat in the bed, cold-faced, thoughtful. He said finally in a precise, almost stately voice:

"You will refrain from informing anyone of what has happened, not even my great-granddaughter and her husband. No one! And —" A bleak smile touched his gray lips—"do not be too outraged by the crime. A man who dares to hold the reins of government is subject to all the risks of the trade, regardless of his age. In fact—"

He paused again. His smile twisted ironically as he went on:

"In fact, as is already apparent, the struggle for succession to the power of an old dictator is bound to be ferocious. A year ago a battery of doctors, including yourself, said I had at least fifteen more years of life ahead of me. That was very welcome news because I had, and have still, to decide who shall be my successor."

He smiled again, but there was a harshness in his voice as he went on:

"I now find that I have four days in which to make my decision. That is, I *think* I have four days. Is there anything in the news that will cut me down to even less time than that?"

The doctor was silent for a moment, as if he was organizing his mind; then:

"Your armies are still retreating, sir. Machine guns and rifles out of museums are almost useless against the forbidden atomic weapons of the rebel general, Garson. At their present rate of advance, the rebels should be here in six days. During the night they captured—"

Arthur Clagg scarcely heard. His mind was concentrating on the words "six days." That was it of course. His great granddaughter Nadya, Merd Grayson her husband—the whole power group in the citadel wanted to force his hand before the arrival of the rebels. He grew aware again of the doctor's voice:

". . . Mr. Medgerow thinks that the fewness of their numbers prevents them from making a breakthrough. They—"

"Medgerow!" echoed Arthur Clagg, blankly. "Who's Medgerow? Oh, I remember. That's the inventor whose writings you once tried to bring to my attention. But, as you know, science no longer interests me."

Dr. Parker clicked his tongue apologetically. "I beg your pardon, sir. I used his name quite inadvertently."

The old man made a vague it-doesn't-matter movement. He said:

"Send in my valet, as you go out."

The doctor turned at the doorway. And a grim look crept over his thick face.

"Sir," he said, "I hope I will not seem presumptuous when I say that your friends and well-wishers will wait anxiously for you to turn *the* weapon on all your enemies."

He went out.

Arthur Clagg sat there, icily satiric. Fifty years, he thought, for fifty years the world has been educated against war, against the use of weapons. For fifty years he had poured the wealth of the earth into the purest constructive channels, into social security, public works that *were* public and not mere political catchpolls.

The continents had been transformed; every conceivable idea for improvement within the bounds of scientific possibility had been subjected to the marvelous pressures of money and labor.

Green and fruitful in summer, gorgeously scientized in winter, peaceful and prosperous the year round, earth turned its made-over face towards its sun, a smiling, happy face. There was not an honest man alive who ought not to glory in the miracle that had been wrought during the brief span of half a century.

He had taken over a world devastated by atomic energy misused, and had changed it almost overnight into a dream of a billion wonders. And now—"

Arthur Clagg suddenly felt his age. It seemed incredible that the first crisis could evoke the oldest evil impulse in human nature.

Kill! Destroy all your enemies. Be merciless. Bring out the irresistible weapon.

The surge of bitter thought quietened, as a discreet knock came at the door. Arthur Clagg sat heavy with his problem, as his valet entered. At last his mind calmed with the beginning of, not decision, but purpose.

The day passed. There was nothing to do but carry on his routine—and wait for his poisoners to come to him. They knew they had only four days in which to act. They wouldn't waste any time.

The intermediary would be Nadya or Merd.

It was like a thousand other days of his old age. All around him was movement, footsteps hurrying to and from his apartment, secretaries, department heads, police agents, an almost endless line of the people who kept him in touch with what was going on. A world of low voices telling him, telling him the monstrously many facts about a gigantic government whose every action was taken in his name.

The details only had to be left out. Except for that, everything absorbed him. Trouble in Chinese Manchuria—Renewed guerrilla activity in the virgin forest land of what had once been Germany—The cities controlled by the rebel general, Garson, were loosely held, and were not dangerous in themselves. "Very well. Go on sending them food—" Of all the government scientists, only a man called Medgerow had a wide acquaintance among important personages in the citadel.

"Hm-m-m," the old man mused aloud. "Medgerow! The name has already come up once today. What's he like?"

The chief of the State police shrugged. "Cultured conversationalist, abnormal though fascinating personality. But we've got nothing on him except that a lot of people go to see him. If I may ask, sir, why this interest in scientists?"

Arthur Clagg said slowly: "To my mind, no group either inside or outside the citadel would dare to act against me in this machine age, without a scientific adviser."

The police officer said matter-of-factly: "Shall I pick him up, and put on the pressure?"

"Don't be silly." Curtly. "If he's a good scientist, the simple little games you play with mechanical hypnotism and lie detectors won't catch him. But your action would have meantime served to warn the bigger game. You have given me the information I desire: So far as you know, there is no secret revolutionary force operating inside the citadel?"

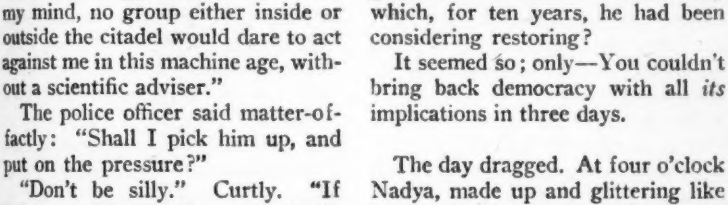
"That is correct, sir."

When the police chief had gone, Arthur Clagg sat sunk in thought. There no longer seemed any doubt. His first suspicion was correct. The poisoners were his own people.

It was the implication that was disturbing. Was it possible that, no matter how honorably a dictator might rule, his very existence kept *in* existence the violences of human power lusts, made bloodshed inevitable and, in its intensional structure, held the seeds of a far, wider, greater chaos than the democracy which, for ten years, he had been considering restoring?

It seemed so; only—You couldn't bring back democracy with all *its* implications in three days.

The day dragged. At four o'clock Nadya, made up and glittering like a movie star, came in with a rustling of silk and a *clack-clack* of high heels. She brushed his cheek with her perfumed lips, then lighted a cigarette and flung herself onto a settee.



He thought: Nadya, poisoner. And felt a shock like fire. Earlier, the idea had been easy enough to accept, part of the life of intrigue that sinuated around him.

But *his* great granddaughter! The last blood tie he had with the human race. All the rest, the noble Cecily, the quiet intellectual Peter, the first and loveliest Nadya, and the others, had slipped away into their graves, leaving him alone with this sanguinary betrayer and murderess.

The dark mood passed as swiftly as it had come, as Nadya said:

"Grandfather, you're impossible!"

Arthur Clagg studied her with abrupt but detached good humor, Nadya was twenty-eight. She had a pretty face, but her eyes were hard and bright, calculating rather than thoughtful.

She had once had great influence over him; and the old man realized with a cool objectivity why that had been so: Her youth! The vibrant purely animal spirits of a young girl had blinded him to the fact that she was just one more stranger not too cleverly out for what she could get.

That was over.

He waited; she went on earnestly:

"Grandfather, what is in your mind? Are you going to permit the rebel Garson and that upstart parliament which is sponsoring him—are you going to let them shove you aside? Are you giving up without a fight, letting us all go down to ridicule and ruin because of your refusal to face the fact that human nature hasn't changed?"

Arthur Clagg said softly: "What would you do in my place, Nadya?"

It was not an answer to her tirade; it was designed purely and simply to draw her out. Up to a few years before, whenever he had given in to her wishes, that was the question that had always preceded the act of his yielding.

He saw from the way she was stiffening, that she recognized the phrase. A brilliant smile lighted her be-rouged face. Her eyes widened, grew eager. She said urgently:

"Grandfather, it is no exaggeration to say that you are probably the greatest man who has ever lived. In spite of your age, and the fact that you have delegated so many of your powers, your prestige is so great that, though there is gathering confusion resulting from the rebel march on the citadel, your world is holding together. But before you, and terribly near now, is the most important decision of your life:

"You have your tremendously potent weapon. For fifty years you have kept it hidden, but now you must bring it forth, and use it. With it you can decide what the future shall be. Medgerow says there is no record in history of a decision of such importance being defaulted because of the refusal of—"

"Medgerow!" ejaculated Arthur Clagg. He stopped himself. "Never mind. Go on."

Nadya was looking at him. "He's a horrible little man with a personality and an extraordinary self-confidence that makes him interesting in spite of his appearance. An inventor attached to the government science bureau, I believe."

She hesitated. She seemed to realize that the full force of her argument had to be rebuilt now that it had been interrupted. She said:

"Grandfather, in spite of all your repugnance to violence, the fact is that people have already died. If you don't kill the rebels, they will go on exterminating your loyal army, and will eventually reach the citadel. I am going to suspend judgment as to what they will do to us when they get here. But it is a point that you ought to consider. You can't just leave it to blind chance."

She stopped; she drew a deep breath; then: "You have asked me for my opinion. As plainly as I can, I want to say that I think you should disarm the rebels, and then turn your weapon over to Merd. Only through him and me can your life work be saved from violent transformations. The laws of political accession are such that other groups would have to tear down at least part of the edifice you have so carefully built up. The world might even dissolve once more into separate contending states. The death toll *could* reach fantastic proportions.

"Can't you see—" She was so earnest that her voice trembled"—"it is to our interest, and ours alone in all this wide world, to keep things as they are. Well," she finished with an unnatural casualness, "what do you say?"

It took a moment for the old man to realize that, for the time at least, she had finished.

After a moment, it struck him that he was not altogether displeased with her verbal picture. For all its cool bloodedness, it was a gentle solution to a deadly situation. For, as she had said, the choice was no longer between killing and not killing. Government soldiers had already died before the blast of atomic cannon, and, according to reports, mobile artillery had wrought havoc in the rebel ranks.

Death was definitely involved. Nevertheless—

Only a monstrosity of a man would hand a world and its helpless people over to a gang of poisoners.

He saw that Nadya, for all her return to casualness, was watching him anxiously. Arthur Clagg laughed, a silent, bitter laughter. He parted his lips, but before he could speak, the young woman said:

"Grandfather, I know you've hated me ever since I married Merd. You may not be aware of that dislike, but it's there; and the reason for it is emotional. I haven't dared mention it to you before, but this is an ultimate crisis. Within six days, atomic cannon will be burning at this citadel; and in the fire of such a reality, not even the feelings of an old man can be spared."

"Hated you!" said Arthur Clagg.

It was not a reaction. It was a pure expression, a sound having no origin in thought. He did note in a remote part of his mind that she had said six days, not four. She apparently did not anticipate a crisis at the moment of his death. The implication, that she knew nothing of the poisoning, was startling.

She could, of course, have such firm mental control over herself that the seemingly unconscious reaction was actually deliberate. There was no time to think about that. Nadya was speaking:

"You've hated me in a perversion of love. I was all you had, and then I got married; and, naturally, thereafter Merd and the children came first. Grandfather, don't you see—that is why you hate me."

The gathered effects of the poison made thinking hard. The old man remained stiff, and, at first, hostile. He began to brace himself mentally. With a sudden, reaching effort, he threw off the queasy weight of his sickishness. Briefly, his mind drummed with energy. Thought came in the old, flashing way.

He relaxed finally, astounded. Why, you old fool, he thought. She's right. That *is* why you disliked her. Jealousy!

He studied her from under shaggy eyebrows, curious, conscious that earlier impressions were now subject to revision. In many ways Nadya's was a distinctive face, not so good-looking but definitely aristocratic. Funny how people got that way. He himself had always had a professorish sort of countenance and yet here was his great-grandddaughter looking like a patrician.

Why was it that no one had ever educed the natural laws that would explain why the grandchildren of people who ruled all had the same expressions on their faces?

Arthur Clagg shook himself, and drew his mind back to Nadya. She had on, he decided after a moment, severely, too much make-up, almost as much as some of the hussies who fluttered around the citadel.

You could scarcely blame a woman though, for being in style.

The old man began to feel staggered. What was happening to his case against her?

Here she sat, a lean, aristocratic woman, anxious to retain her high position—who wouldn't in her place?—clever rather than intellectual, a little callous perhaps. But all people who commanded had to harden their hearts to individual suffering.

He who had lived in an age where a tornado of atomic energy killed a billion human beings *had* to have as successor a person who, in the final issue, was capable of exterminating anyone daring once more to precipitate such a holocaust. And now that there was doubt as to whether Nadya was a party to the poisoning, she was again eligible.

But if she and Merd weren't guilty, who was?

The old man sat shaken, uncertain. He might never find out, of course, in spite of the fact that the need to know was rapidly becoming an obsession. But he couldn't condemn anyone without proof. He said slowly:

"Leave me now, Nadya. You have presented your case well, but I have not decided. Tomorrow, I intend to—Never mind."

He waited till, with puzzled side glances, she had left. Then he picked up his private radio phone. It took a moment to establish the connection; then:

"Well?" said Arthur Clagg.

The police chief's voice came: "The arrangements are made. The meeting will take place in no man's land. He agrees to the presence of three bodyguards."

The officer broke off: "Sir, this is a most dangerous business. If anything should go wrong—"

The old man said curtly: "You are having the Mobile outfitted according to my instructions?"

"Yes, but—" Earnestly: "Sir, I ask again, what is your purpose in talking to General Garson?"

The old man only smiled tightly, and hung up. He had not one but two purposes in meeting Garson. It wouldn't do to tell anyone that his first purpose was to hear the case of the rebels. As for his second reason—

His smile deepened. No use broadcasting that either.

"Remember," said Arthur Clagg to his chief officer, "take no action till I tug at my ear."

The unpleasant part of the whole business was walking fifty feet from his Mobile to where the tables and chairs had been set up in the open meadow. Every step he took twisted his insides. Gasping, he sank into one of the chairs.

He was beginning to recover when a lanky individual in an all-fitting blue uniform descended the steps of the second Mobile, and strode across the grass. The man's movements had all the awkward freedom of the unrestrained extrovert.

Recognition was unmistakable. The lean, bony face with its lantern jaw had already stared at him several times from photographs. Even without the countenance, the nasal twanged voice, which had twice broadcast on the radio, would have made the identification inevitable. Rebel General Garson was photo and voco-genic. He said:

"Old Man, I hope you haven't got some slick scheme up your sleeve."

It was loudly said, too loudly to be polite. But Arthur Clagg was too intent, too curious, to notice. Nor did he think immediately of replying. He was conscious of a genuine absorption in this man who dared to oppose the irresistible weapon.

Garson had brown eyes and uncombed, sandy hair. He sank into his chair, and stared unsmilingly at his aged opponent. Once more it was Garson who spoke, snappingly this time:

"Get to the point, man."

Arthur Clagg hardly heard. Nor did the details of physical appearance interest him now. It was the man, his boldness in organizing a small army in a vast land, his defiance of death for an ideal, that almost, in itself, merited success for his enterprise.

Slowly, the old man straightened his anguished body, said with dignity:

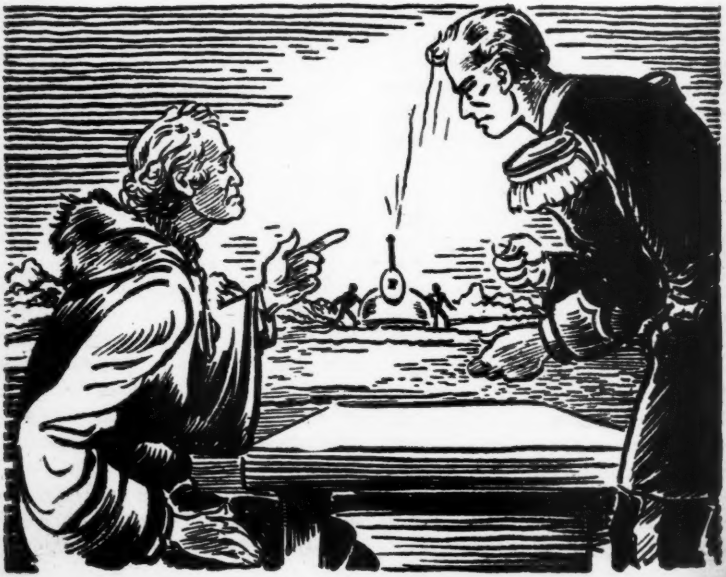
"General Garson—as you will notice, I am recognizing your military title—to me you represent a trend of thought in the country. And as a result I might, if you can give me some dialectical arguments, allow parliament to be re-established under your mentorship. I am not opposed to democracy, because, except for the disaster in which it involved itself half a century ago, it was a vigorous, marvelously growing organism. I have no doubt it can be so again. The danger is the free use of atomic energy—"

"Don't worry about that." Garson waved a gaunt hand. "My congress and I will keep it to ourselves."

"Eh!" Arthur Clagg stared across the table, not sure that he had heard correctly. He had the sudden, blank feeling that meaningless words had been projected at him.

Before he could speak, or think further, the lanky man leaned forward. The small brown eyes peered at him.

"See here, Mr. Dictator Clagg, I don't know just what you had in mind, asking me to come over. I thought maybe you wanted to surrender, now that I've called your bluff. Here's my offer: I understand you've got some kind of estate down south. O.K. I'll let you an' your granddaughter and family live there under guard. If anybody



starts somethin', naturally they get killed.

"My congress will set me up as president, and I'll just slip into your position as quickly as I can. In a few months everything'll be goin' along smooth as ever. That clear?"

The shock was greater. There seemed nothing to think. At last Arthur Clagg expostulated:

"But see here, you haven't got a congress yet. A congress is a governing body elected by secret ballot by the vote of all the people. Two hundred men can't just organize and call themselves congress. They—"

His voice trailed, as the implications penetrated of what he was saying. It seemed incredible but—was this man so ignorant of history that he didn't know what representative government was?

The old man tried to picture that. The psychology of it finally grew plausible. Like so many human beings, Garson was only dimly aware that there had been life before his own ego emerged from the mists of childhood.

To him, that pre-Garson period must be an unsubstantial hodgepodge. Somehow the words "congress" and "president" had come down to him. And he had made his own definitions.

With an effort Arthur Clagg drew his attention back to Garson. And the thought came finally: After all, it was the courage of this creature that was fascinating. A man who had the boldness to defy *the* weapon must be amenable to reason and to a partial re-education.

"Boy!" Garson's voice twanged. "You sure have been smart, Clagg. All these years pretending you had a super weapon, and fixing up books and motion pictures and things to make people think it all happened the way you said. You never fooled me though; and so now you've had your day. I'll sure carry on with that weapon game, though. It—"

His voice went on, but Arthur Clagg did not listen. He waited until the sound stopped; and then with a casual gesture tugged at his ear.

He saw Garson stiffen, as the mechanical hynotic waves struck at him. The old man wasted no time.

"Garson," he intoned, "Garson, you will be glad to tell me, tell me, tell me who gave you the blueprints for atomic cannon. Garson, was it someone in the government? Garson, it is so easy to tell me."

"But I do not know." The man's voice was faraway somehow, and vaguely surprised. "They were given me by a man I do not know. He said he was an agent, an agent —"

"An agent for whom?" Arthur Clagg pressed.

"I do not know."

"But didn't you care? Didn't it worry you?"

"No, I figgered as soon as I had the cannon, the other guy would have to start worrying."

After three minutes. Arthur Clagg tugged at his ear again—and Garson came back to normal life. He looked a little startled, but the old man was not worried about the suspicions of so completely ignorant a man. He said icily:

"Since I gave you my word, mister, you may depart at once in perfect safety. I would advise you, however, to keep on traveling, because tomorrow no one in the vicinity of an atomic cannon will be alive.

"In any event I shall advise"—pause—"my son-in-law, my heir and successor, to hunt you down and have you brought to justice."

He was thinking as he finished: There was no time for further choice.

The house was one of a row of pleasant mansions that stood amid greenery in the shadow of the towering peak of building that was the citadel.

The outer door must have opened by remote electrical control because, when Dr. Parker had gone through, he found himself in a narrow metal hallway. A tiny bulb in the ceiling shed a white glow upon a second door, which was all metal. The doctor stood motionless, then he called, shrilly:

"Medgerow, what's all this?"

There was a mechanical chuckle from one of the walls. "Don't get excited, doctor. As you know, the whole situation is now entering the critical stage, and I am taking no chances."

"B-but I've been here a hundred times before, and I've never seen any of this . . . this fortification."

"Good!" Medgerow's voice came again through the wall speaker. He sounded pleased. "It would take an atomic cannon or"—pause—"Arthur Clagg's Contradictory Force to blast me out of this. But come in."

The second door opened into a paneled hallway, and clanged behind Parker. A small man was waiting there for him. He chuckled as he saw Parker, then said curtly:

"Well, your report, man! You administered the poison substitute successfully?"

The doctor did not reply as he followed the other into the living room. These first moments in the presence of Medgerow always made him uneasy. Adjustment from normalness to unnormalness was a semi-involved process.

It wasn't so much, Parker realized bleakly for the hundredth time, that Medgerow's ugliness by itself was so jarring. A thousand males picked up at random from the streets outside would have yielded a dozen whose physical characteristics were less prepossessing.

Medgerow differed in that he exuded a curious, terrible aura of misshapen strength. His personality protruded with the concreteness of the hump of a hunchback. It seemed to make him not quite human.

Parker had discovered that, by letting only the corner of his eyes be aware of the man, he could stand his presence. That was what he did now. And said:

"Yes, I administered the substitute two nights ago. As I told you, the pain effects will be the same as with the real poison."

The image in the corner of the doctor's vision stood stock-still; then:

"He thinks he will die after four days?"

"Yes. And his reaction was to swear me to secrecy." He broke off anxiously: "Are you sure, are you absolutely sure that you can nullify his weapon long enough to seize control of it? How can you be positive that he will even use it?"

Medgerow clicked his tongue impatiently. "Of course I'm not sure. I am basing my estimations on the character of a man whose actions, speeches and writings I have studied for years. At this very moment, I'll warrant, the old man has practically decided to use the weapon in one way or another. In my opinion, he will use it to act against the rebels, and will then turn the weapon over to his son-in-law.

"This is all to the good. I want *him* to stamp out the rebel force before I move against him.

"In my opinion, the crisis will be tomorrow. If I read Arthur Clagg aright, he will by now have sought a meeting with General Garson, the rebel leader. He will have found a man who embodies the worst features of the demagogue. And, besides, Garson has dared to use atomic power. That, as I have told you, will balance in the old man's mind his suspicion that his great granddaughter helped to poison him.

"Oh, yes, he'll use the weapon. And that"—the little monstrosity of a man chuckled—"is where I come in. Little did Arthur Clagg realize fifty years ago that he established a precedent, and became the first, not the last, of the scientist leaders. Now that men's minds accept such a possibility, scientists will begin to think in that direction, unconsciously molding their lives and their works with the hope of power in their minds. Such are the laws of dialectical materialism. But now I must—"

He broke off; his voice lost its sustained quality, of intensity, grew quiet.

"Thanks for coming, doctor. As you know, we couldn't take the chance of a phone call being intercepted, particularly as the secret police have been making guarded inquiries about me."

As they shook hands, Medgerow, his blue eyes glistening, said:

"You have done well, Parker. I'm sorry you were too squeamish to use the real poison, but that can be remedied when I get into power As it is, your assistance in helping me force the old man to bring out his weapon will gain you the reward you desire. Arthur Clagg's great granddaughter, Nadya, will be *given* you in marriage as soon as her husband has been decently disposed of."

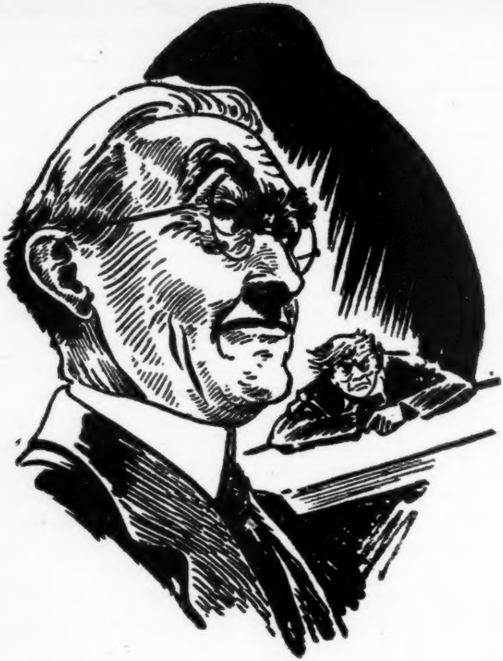
"Thank you," said Parker quietly.

Contemptuous-eyed the little man watched him go. He thought coldly:

Silly ass doctor! Couldn't he see that the public necessities of the situation required that the only legitimate heir of the *former* dictator marry the new ruler?

Pawns didn't take queens.

Speed was essential. He sent the invitations to Merd and Nadya for that afternoon. They arrived shortly after lunch. In spite of himself,



the old man found himself staring searchingly at his son-in-law, seeking in the man's lean face reassurance that the colossal trust he was about to receive would not be misused.

He saw gray eyes, dark hair, a rather fine, sensitive face with stern lips—exactly the same physical characteristics, the same person, he had so violently disliked from the very first announcement of Nadya's betrothal. The body not the mind was visible.

It was not enough. The thought was a pain briefly greater than the agony of the poison. And yet, the decision was made. A man with two days to live couldn't think of anything but the easy solution. Arthur Clagg said curtly:

"Lock all the doors. We're going to uncover the weapon. It will require most of the afternoon."

Merd said explosively. "You mean, it's *here?*"

The old man ignored that. He went on drably:

"The weapon is mounted inside a plastic airplane, powered by four gas turbine jets and strato rockets. This machine is hidden in the east wing of the citadel which, as you perhaps know, was built by workers from every part of the world. The employment of men from far places who did not speak the same language made it possible to construct a hiding place without anyone guessing its true purpose."

He broke off, fumbled in his coat pocket, and produced a key.

"This will unlock a tool cupboard next to my bathroom. Bring the tools in here. You will need them all to uncover, and then activate the mechanical keys that will open the hidden chamber."

It took time, the two young people silent and intent on their unaccustomed work, carting machine saws, atomic drills, mobile planes into various indicated parts of the living room. When all the tools were gathered, the old man motioned them to the settee near him, and began:

"There has been a great deal of wild talk about the nature of my weapon. The speculation is quite unnecessary because many years ago I very foolishly gave out some of the theory in a series of articles published in the government science gazette. It was foolish, not because anyone will be able to duplicate the weapon but because—"

He broke off, frowning. "Never mind. I'll explain that later."

He went on, quietly: "The theory behind the Contradiction Force penetrates to the inner core of the meanings of life and of movement. Life, as you know, has been defined as orderly movement. There is movement also in inorganic matter, but this is a primitive version and is explained by the larger concept.

"What makes movement possible? Why does not matter, organic or inorganic, simply collapse into its basic components, and, thus inert, fulfill its apparently senseless destiny?

"You might answer that things are as they are because electrons whirl in orbits according to fixed laws, forming atoms which, in their turn, have a physically legal relationship to the larger structure of molecules, and so on. But that would be merely evading the issue.

"Movement occurs in an object because *in* it, in its very basic oneness, there is an antithesis, a contradiction. It is only because a thing contains a contradiction within itself that it moves and acquires impulse and activity.

"The theory by itself suggested the nature of the research: I found first what were the laws governing the contradiction in various types of matter, and I shall give you the mathematics in due course.

"The mechanical problem of practicalizing the theory, involved in its simplest functions the procuration of a force that would cause the contradiction in any given matter to operate, not in the orderly fashions that nature has laboriously evolved, but uncontrollably.

"Those who have not seen it in action cannot imagine how terrible the result is. It is not, has no relation to, atomic energy. As a destructive force, the hellish active area in the interior of a nova sun possibly equals it in violence, but such a sun cannot even theoretically surpass it.

"Fortunately, heat is not a by-product, as would be the case if the force was related to atomic or electrical energy.

"It was only long after the weapon was an actuality that I discovered that I had hit on a billion-to-one chance, that my discovery was an accident that cannot be repeated in a million years.

"Tomorrow you will see it in action."

He paused and frowned, partly with pain, partly because—

"The weapon has only one aspect that is dangerous to us. It can be nullified by a simple, electrically induced magnetic flow in the object on which it is focused. That is why I was foolish in giving out the theory.

"Some day, somewhere, a smart scientist will discover the nullifying principle—and the weapon will cease to be a factor in world politics.

"I must confess I have worried about that in the dark watches of many nights. But now" — He straightened slowly—"let us get to work—"

Minute by minute, as the hours passed, his choice seemed more and more final.

The third day dawned cloudless. It was one of those brightly perfect spring mornings. The world below the plane was a gorgeous panorama of emerging green. Even now, with the anguish tearing at his body, it was hard for Arthur Clagg to realize that, in this setting of eternally youthful soil, his mortality was seeking its final ecstasy of expression.

They came to the rebel lines, and began to circle. The telescopes showed metal glinting among the trees below—and Arthur Clagg, with Nadya leaning over his shoulder, examined the maps the army had supplied.

"Climb higher," he ordered finally. And again, minutes later: "Higher."

After ten minutes more: *"Higher!"*

"But we're up about thirty-five miles," Merd protested. "We've already used up three quarters of our rocket fuel."

"Higher!" said the old man inexorably. "The problem at all times with this weapon is to remain clear of the explosion. When I first estimated mathematically its power, I hardly believed my figures. Fortunately, I had the sense to rig up a device that would cut off the force after one millionth of a second. If I do that now, and set this dial to 'METAL,' only the outermost rim of atoms on the one cannon below that I'm aiming at, will be affected."

He finished: "When you have five minutes fuel left, tell me."

Merd's voice came over the earphones. "Less than five minutes left now. I'll have to turn over to the jets."

"Steady!" said Arthur Clagg.

He had left the telescopic sights, and was swinging the gun around, locking it into place. Once more he looked through the sights. He

pressed the trigger.

The ground below turned bluer than the sky. For a long moment, it looked like a placid lake in a glacier. Then the lake was gone. And where there had been trees and green beauty was a gray-black hole thirty miles in diameter.

Desert!

"Grandfather," Nadya cried. "The gun is swinging back. It'll hit you."

The old man did not move from the sights. The gun swung in a one hundred eighty degree arc, and clicked back into position just beside his head. He said, without looking up:

"It's all right, I made it that way."

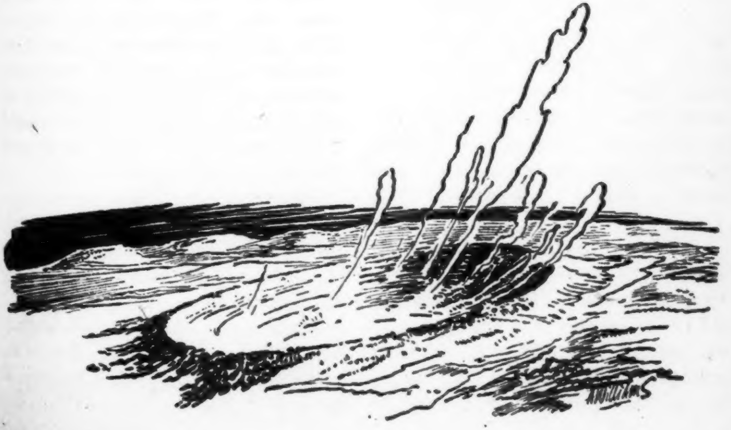
A moment longer he looked, then he straightened. Awareness came that the plane was shuddering with speed, the jets whistling shrilly.

He sat down. He leaned back, weary, feeling strangely old. Slowly, he straightened, fighting the pain and the fatigue. Merd's voice came over the phones:

"Grandfather, there's news coming through from the citadel. Some idiot has started a revolution. Listen!"

A strange voice sounded: ". . . A rebellion in the air force . . . uprising in the citadel garrison, with fighting now going on in the gardens. A man named Medgerow has declared himself to be the new dictator—"

There was more, but Arthur Clagg's mind followed it no further. Medgerow. Funny, how the name



had come up so often the last few days, almost like predestination. Nadya had mentioned him, and Dr. Parker and—"

The old man sagged a little. Parker—poison. For a moment, the connection seemed impossible. What could be the man's motive? Except for a tendency to lose control of his emotions, Parker was a timid, cautious fellow with a reasonably good mind.

Arthur Clagg sighed. There was no use thinking about it. Medgerow had precipitated a palace revolution before the arrival of Garson. Like Garson, the new usurper was apparently not taking the slightest notice of an old man and his mythical contradictory force.

Perhaps he should have announced in advance his intention to use it.

No use worrying about that now. The die was cast, and there were things to do. He straightened.

"Nadya."

"Yes, grandfather."

"Jump."

He had almost forgotten that people never disobeyed him when he took that tone, that manner; it was so long since he had used it.

One measured look she gave him. Then she was running forward to Merd. She came back, tears in her eyes. Her lips touched his. She said:

"I shall join the children at the Lodge, and wait till I hear from you."

He watched her fall into the blue haze. It was five minutes later that Merd's voice came over the radio:

"There're some planes following us, grandfather. What—"

Three times Arthur Clagg pressed the trigger of the Contradictory Force weapon, but the planes came on, untouched, unharmed. At last, he whispered his defeat over the phone:

"Better obey their signal, Merd, and go down. There's nothing we can do."

They were actually landing before he realized he was still holding the weapon. He stared down grimly at the now useless double cone, and then let it slip clear of his fingers. He watched it swing back in its one hundred eighty degree arc, and click metallically into its rest position.

It lay in its cradle, still omnipotent under the right conditions. But by the time it was used again, Merd and he would be dead, and the law and order world he had created would be scrambled by the passions of men. And it would take a hundred years to put all the pieces together again.

The devil of it, the irony, was that Medgerow had no reason to use it immediately. He felt the plane settling on its jets. Gently it touched the ground. Merd left the controls and came back to him immediately.

"They're signaling us to get off," he said quietly.

Arthur Clagg nodded. In silence they climbed to the ground. They were about a hundred feet away when the other planes began to disgorge men, most of whom carried tubes of rocket fuel to the big plane. One of the men, however, a tall chap in air force uniform, came over. He said insolently:

"The Medgerow orders that you be searched."

*The* Medgerow. Merd submitted stonily, but the old man watched the procedure with a bleak admiration for its thoroughness. When the man had finished, Arthur Clagg said:

"Satisfy my curiosity. Why did you rebel?"

The officer shrugged. "The—deadness—you created was killing my will to live. The Medgerow is going to release atomic energy. We're going to the planets, perhaps even the stars, in my lifetime."

When the officer had gone, Arthur Clagg turned to Merd, said:

"My desire for order grew out of the hideous misuse of atomic energy. But I always knew that man was the Contradictory Force of the organic universe, and that sooner or later, for better or worse, he must again be allowed to play with that ultimate fire. Apparently, the time has come."

A small man was climbing out of the nearest plane. He carried an atomic in one hand. He came forward briskly. And even though he had never seen Medgerow before, it seemed to Arthur Clagg that he would have recognized him anywhere, without any more description than he had already received by chance.

Merd was speaking distastefully: "I've discovered that by letting only the corner of my eyes be aware of him, I can stand his presence for a while."

It was an odd and altogether fascinating statement. The words drew the old man's attention briefly away from Medgerow. He felt momentarily absorbed by the insight they gave into Merd's character.

He found himself liking his son-in-law better.

There was no time to think about either Merd or his words.

Medgerow stood before them.

He looked unnormal. It wasn't so much, Arthur Clagg decided bleakly, that Medgerow's ugliness was jarring in itself. A thousand males picked at random would have yielded a dozen whose physical characteristics were less prepossessing.

Perhaps it was the triumphant smile on his face, with its frank and unashamed arrogance. It was hard to tell. The man exuded a curious, terrible aura of misshapen strength. His personality protruded with the concreteness of the hump of a hunchback.

Gazing at him, old Arthur Clagg felt a chill, a sick consciousness of the extent of his failure. It seemed incredible that he had let himself be panicked into using his weapon, and had not once suspected that that was exactly what his hidden enemy was working for.

He thought: *The* Medgerow, heir of earth—the very idea was shattering.

Medgerow broke the silence, coolly: "In a moment I shall get into your plane and start climbing. As soon as I have reached a safe height, I shall fire at this"—he drew a strip of metal from his pocket, and tossed it onto the ground—"with your weapon. I like ironies like that."

For a moment, the old man could not believe that he had heard aright. The intention, so deliberately stated, was so far reaching in its implications, so unexpected, that it seemed impossible. He opened his mouth, then closed it again. The hope that came shook his very bones; it had no parallel in the long history of his career.

It was Merd who finally reacted vocally, Merd who said violently:

"But there's a city of fifty thousand over there about eight miles. You can't fire the weapon so near it."

Arthur Clagg fumbled at Merd's arm. He wanted to tell the young fool to stop arguing. Couldn't he see that Medgerow was playing into their hands?

But of course he couldn't. Merd didn't know the fear that had in the long ago made his great-grandfather-in-law install the weapon in the way that he had. Before he could decide how to stop Merd, Merd cried:

"Put a bullet through our brains, you murderer. You can't destroy a whole city. You *can't!*"

Once more, in a haze of anxiety now, Arthur Clagg parted his lips to utter words that would silence Merd. Just in time, he saw the look on Medgerow's face. And closed them again.

No words were needed. The best ally he had in this fateful moment was *the* Medgerow himself.

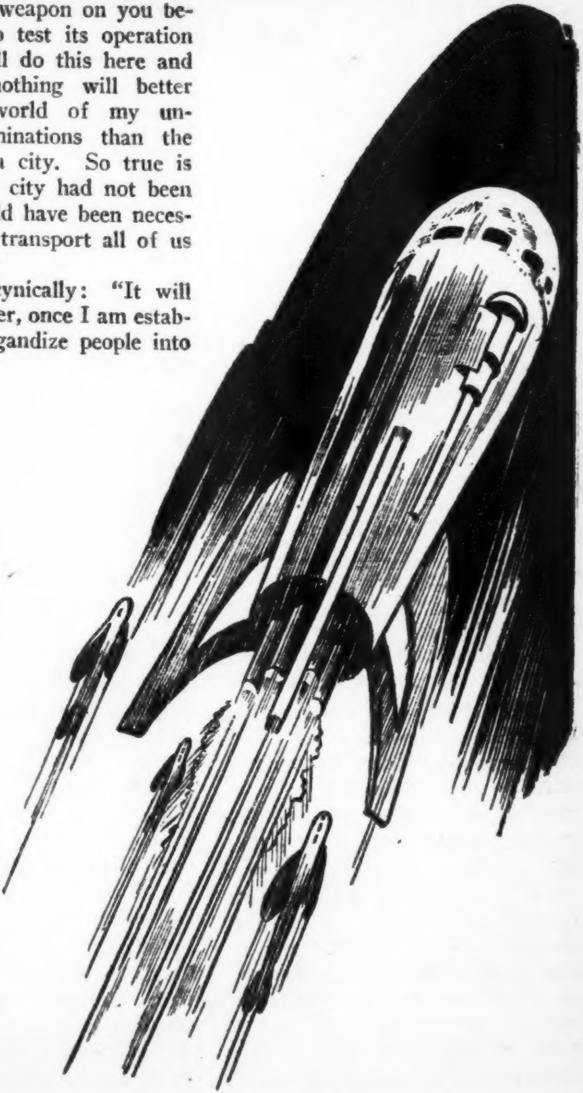
The little man stood, head flung back proudly. His eyes blazed with sardonic joy. He said:

"I shall not make the mistakes of the new princes of history. I have no desire to be dragged, as was Cromwell, out of my grave and hanged as a public spectacle. Nor shall I be so slow in starting my executions as were the early French revolutionists. And as for those talkative idiots Felix Pyat and Delescluze in 1871 Paris—it makes me sick just to think about them.

"Mussolini allowed himself to be caught in the same net. He permitted his potential destroyers and betrayers to remain alive. Hitler, of course, had half his work done for him when the Allies rid Germany of the Hohenzollern dynasty. He made only one mistake: Russia. Everybody's plans were naturally blown sky-high when atomic energy appeared on the scene."

Immeasurably savage grew his voice: "Force and terror—those are the weapons that win, when there are no undefeated armies extant to support opposition groups. I shall use the weapon on you because I have to test its operation anyway. I shall do this here and now because nothing will better convince the world of my unalterable determinations than the destruction of a city. So true is this that, if the city had not been to hand, it would have been necessary for me to transport all of us to its vicinity."

He finished cynically: "It will be a simple matter, once I am established, to propagandize people into



believing that it was you, not I, who destroyed it."

"You can't do this," cried Merd wildly. "It's not human. It's—"

Firmly, this time, the old man caught his arm. "Merd," he said resonantly, "can't you see it's useless? We're dealing with a man who has a plan, a settled policy of conquest."

The remark seemed to please Medgerow. He said with satisfaction:

"That's right. Argument is useless. I never missed a bet in my strategy. You did everything exactly as I intended you to. Your decision had to be made too swiftly. You had no time to think."

"My foolishness," said Arthur Clagg quietly, "was in thinking all these days and years that there was a decision to be made. I've just realized that, actually, I made my choice long and long ago. I chose, not self, but the good of all mankind, whereas you have chosen self."

"Eh!" Medgerow looked at him sharply, as if searching for a hidden meaning. Then he laughed. Then he said, arrogantly:

"Enough of this chatter. You ruined yourself twenty years ago, Arthur Clagg, when you ignored the letters sent you by a struggling science student, myself. I realize now you probably didn't even receive them. But that excuse doesn't apply to later years when powerful friends tried to draw my work to your attention; and you wouldn't even look at it."

He was suddenly livid with rage. He spat:

"Twenty years of obscurity—During the next twenty minutes, I'll let you think of what might have been if you had treated me from the beginning according to my merits."

He whirled away. The plane door clanged behind him. The gas turbines whined. The jets hissed. Lightly, swiftly, the plane rose into the sky. It became a dot.

After a minute, the other planes took off and the two men were alone.

There was a long silence. At last, cold and contemptuous, Merd said:

"This creature cannot see that you are not, and never were, his type of dictator. The history of democracies teaches that in emergencies people will temporarily surrender their liberties. No greater emergency ever existed than the release of atomic energy. The period of control has been a long one, because the world had to be reorganized; and, like a new mold, allowed to set.

"In my considered opinion, the people are ready again to take over; and no one, not Medgerow, not me, not all the force anyone can possibly exert will stop them."

"Why, Merd," said Arthur Clagg, "I didn't know you felt like that. In fact, you have provided me with a whole series of pleasant shocks. Under pressure, you have showed a very great number of golden attributes. Accordingly, I herewith commission you to begin re-establishing democracy as soon as we return to the citadel."

The young man was staring at him wildly. Then he swallowed hard. At last, shakily, he asked:

"W-what did you say? Back to the citadel—"

Arthur Clagg felt a sudden sympathy for his great grandson-in-law, a sharp understanding of the agonized turmoil being experienced by a man who had geared himself to death, and now was confronted by the possibility of life.

It seemed curiously important that Merd suffer no more than he had to. The old man said grimly:

"I was terrified that some day the Contradictory Force would be set off accidentally. I therefore constructed the weapon so that its muzzle resembled its stock. I placed it so that it would swing around automatically after I had fired it, and point up towards the sky or towards any stranger who might be impelled to fire it. *That is the position it is in this very moment, as Medgerow stands aiming it.*"

Old Arthur Clagg finished in a ringing tone: "Not with Medgerow, but in your hands, Merd, lies the destiny of mankind."

He did not know then that the poison inside him was only a substitute, and that he would be the wise old mentor of the new and lusty civilization of the stars.

THE END.

You ease off beard in jigtime, men,
With Thin Gillettes—four blades for ten—
They save you dough and treat you well—
And your face sure looks and feels swell!
Outlast ordinary blades two to one
THIN
Gillette
BLADES
Gillette
4 for 10c
Produced By The Maker Of The Famous Gillette Blue Blade

# Schedule

## by HARRY WALTON

*Schedules are funny things. If you have it figured right, you can break a man by taking over his schedule—but if you have it figured wrong, it can turn out that two plus two is zero instead of four!*

Illustrated by Williams

In the *Medusa's* shadowy forecabin, lumintubes flickered as the ship staggered under the first thrust of the hyperaccelerators. Then she was over the hump and the tubes burned brighter than they yet had, while energy surged from every atom of the ship, its cargo animate and inanimate, into the Carlson accumulators. Four men looked at one another, tensely expectant as of something certain to come, something familiar yet always to be awaited with trepidation. Deep in the metallic cavern that was the ship, machinery screamed suddenly on a new, rising note.

With the first sharp wail came the familiar sensation of falling—pure illusion yet no less convincing for that. The *Medusa* seemed to be sliding down a precipitous slope at gathering speed. The feeling would last for hours, but its coming eased that other, psychological tension that preceded it.

The subthird spat cheerfully and unzipped his fatigue suit. "That's that until next time, save the Carlsons! I wonder why I stay on this run anyway."

Since the other three couldn't answer that question for themselves, none tried to answer it for the subthird. But it seemed to make the second oiler even more thoughtful than usual, for he took the pipe out of his mouth. Seeing that he was going to talk, even the subthird paused in the act of rolling into his bunk.

"Save the Carlsons!" muttered the oiler. "They'll hold up this trip and a hundred more. You can spend a lifetime on these tubs and never run into anything tougher than a hard-boiled second. Dangerous? You should have been a wildcatter back in the old days. There was the run to Rhea— If you want to kill part of the off watch, I'll tell the yarn."

"Aye, tell it," said the subthird for all of them. The second oiler hadn't always been a forecabin hand, and sometimes his yarns were worth hearing.

Deliberately he knocked the ashes from his pipe into the refuse well. The soft rustle of air through the ventilator grille grew out of the stillness, only to fade again before the oiler's voice.

"Nowadays you don't hear much about Rhea. The main liners still run to Titan, but there's not enough beyond Saturn to keep traffic lively out there, and the Carlsons make it easier to get to Antares in a subship than to reach Uranus in a jet ship. Even Titan's just a tourist stop today, and Rhea's pointed out to the rubbernecks as a moon to steer clear of. The guides tell 'em what would happen to 'em six hours after grounding there, and they enjoy a few shivers before going back to their bridge games.

"That's all Rhea means now. Bismullah's a cargo you never hear about, and Interplan Council sends the Rheans all the salt and sodium they want by a B-9 automatic. Which is cheaper and lots safer than sending a crew ship.

"But in the old days it was different. Titan itself was a pretty tough place for a youngster green from navigation school, like Jimmy Rodgers. It was tough enough without the news he had to hear when he landed from the big Blue Star ship at Titan dock—"

"So that's it, son," Matthews was saying. "And I never hated to tell anything more than this. Your dad was a fine, honest man and a good navigator, God rest his soul."

Jimmy Rodgers swallowed dryly. The bustling scene all around him, the hurrying foot traffic of a great space dock, the fussy activity of automatic unloaders, all seemed suddenly as unreal and absurd as the news Matthews had brought him—alive, moving, noisy, but not actual, like a stereograph sound film. It couldn't be true that his father was dead. Things couldn't happen that way, after all the years of planning toward this day.

But in a coldly sober compartment of his mind he knew that it was so. Men didn't live forever, not even men like Ben Rodgers, the father he hadn't seen in seven years. Funny how much the same he felt as on the day he'd left Titan, a kid of sixteen, alone and awkward and self-conscious in his new whipcords and plastoid cap. But most of all alone. Now he had master's papers and a certificate of competency but felt just as alone. Bitterly he wished he'd never left Titan. To come back to this!

Matthews was studying him anxiously. Now he saluted—the same offhand yet respectful gesture he'd used toward the elder Rodgers. "Beggin' your pardon, son, we can't stay here. Would ye . . . would ye let me stand you to a drink?"

Rodgers nodded, followed the grizzled engine man through the ordered confusion of the landing stage, down a long plank walk, and into a dark little tavern. Afterward he couldn't remember the way they had come.

A glass was set before him. He swallowed its stinging, tasteless contents while his mind remorselessly rehearsed the news. The funeral had been three days ago—he'd missed it by that much. He wished he were sixteen again, and just feeling the hard clasp of his father's hand in that good-by seven years ago.

Matthews was blinking at him across the table. The old spaceman leaned forward. "Guess I know how ye feel, son. He was my friend. But now we've got to get on course—it's what he'd ask of ye if he were here. And there's not much time."

The words penetrated a haze of self-pity. He'd been acting, Rodgers saw, exactly as that kid of sixteen would have. Time he took himself in hand.

"Sorry. Of course I'll carry on. How long since your last voyage?"

"Too long, son. I've had the devil's time with the Interplan Council. The beacon isn't good for much longer. And I hadn't authority to take cargo without ye, even if I'd had a navigator."

"We'll load at once. I'll see the council right away, too. My papers are in order. Are the beacon batteries aboard?"

Matthews swallowed visibly, his gnarled fingers tracing an intricate scroll pattern on the dirty tablecloth. "No, son, they ain't. Fact is, I've got to tell you some things I'd rather not. Ye got here just in time, but it's not all clear landings. First off—"

"Blast me if it isn't young Rodgers," roared a bull-like voice as a bulky figure loomed over the table. "Remember me—Nappy Ames? Say, I'm sorry about your dad. Swell chap. One of the best."

The man pulled a chair out, sat down so hard it creaked in protest. He was fat, but hard beneath the fat, his face-space tanned, the eyes full of a shrewdness that belied his blustering good humor. Rodgers remembered him vaguely as a wildcatter who hauled ore from Japetus, outermost moon but one of Saturn. His father had written once that Ames had offered to buy a share in the *Stardust*, although the man already had a ship of his own.

"You were a kid when I saw you last," the man bellowed amiably. "Just a raw kid. Now you're all set, hey? A real navigator. Going to show us old chaps a few things." He winked broadly at Matthews, who made no response. "Well, I hope you do. We can stand it. Competition's the life of this racket, I always say."

Rodgers forced himself to look at the other squarely. He disliked what he saw, resented Ames' manner, the offhand reference to his father's death.

"I don't suppose I'll add to your competition," he told Ames. "The *Stardust* is sticking to the Rhea run. So far as I'm concerned, the other moons are all yours."

The big man's eyebrows shot up in exaggerated surprise. He turned to Matthews. "Mean to tell me you haven't explained things?"

"Haven't had the chance, with you buttin' in," Matthews growled. "If you'll get out, maybe I can make 'em clear."

"Sure. Sure. No harm meant." The big man heaved himself up off the chair. "Sorry, Rodgers, to have butted in too soon. Matthews will tell you my proposition. Better think it over."

He walked off with the mincing gait of a spaceman accustomed to low gravity. Rodgers waited until he was out of earshot, then turned to Matthews, who spread his broad hands flat on the tablecloth in a gesture of finality.

"O.K., here it is. The council isn't transferring the beacon run to you just like that. Ames has bid in for it. Would have had it by now if you weren't your dad's son. But you'll have to race Ames for it."

"Race?"

"That's it. After all, son, you're new in this game, even though your dad pioneered on Rhea. The council doesn't know you. And that beacon's got to be serviced regular. They know Ames can deliver. But they agreed to wait until you got here to take over the *Stardust*, and to let you and Ames start neck and neck. First one to reach Rhea and flash a code signal from the beacon gets the contract."

"Who else is bidding?"

"Nobody. Them other wildcatters wouldn't land on Rhea for all the bismullah the Rheans can dig up. Takes nerve to ground on a moon you can't stay healthy on more than six hours. Too much can go wrong. Three of Ames' men quit, but he's got a legal crew left—although I don't think there's another spaceman this side of Mars will sign up for the run. Of course, Ames has plenty of guts—he'd go to Hades and back if there was profit in it. Only reason he never tried to butt in before was that your dad had the beacon contract, which paid eighty percent of the expenses and would make it plenty tough for anybody to undersell him on the bismullah end. Which Ames figures will work two ways—if he can get that contract."

"What's that proposition he talked about?" asked Rodgers.

Mathews cracked his knuckles. "Didn't figure you'd be interested in that, son. But maybe you will be, after you've applied for cargo. Your dad could get credit any trip for salt and sodium to trade the Rheans. Well, I asked for cargo, but they said no. Trouble is, son, they don't know ye or what kind of navigator you are. You'll have to put up the *Stardust* as security for cargo."

"What's Ames' proposition?" asked Rodgers again.

"He'll buy the *Stardust,*" Matthews told him, "for eighty thousand credits. And he has the gall to offer to let you captain her on the Japetus run—hauling fertilizer."

Titan was dwindling behind. Ahead lay the glory of ringed Saturn, a fantasy of the heavens, pale-yellow in color, its surface just now leprous with white spots that betokened a storm in its atmosphere. Against the brilliant disk Rhea was a black dot.

A smell of hot condenser oil and jet fuel permeated the *Stardust.* The engines were working hard, but they were giving Ames a good run for his money. The 'scope still showed his *Comet* abreast of the *Stardust* about one hundred miles away. The ships were too closely matched for either to win much advantage on this long leg of the journey. Closer in to Rhea, when landing approaches had to be plotted, better spacemanship would count. Rodgers had worked out that part of the trip with special care.

The aft bulkhead door creaked open, letting the roar of the engines well out from the after part of the ship. Matthews entered the navigation cubby, his face troubled.

"We're pushing her hard, son," he complained. "The turbos are heatin'. They won't take any overload on deceleratin'."

"Won't have to. We'll cut in the gravity screens in reverse." Rodgers jabbed a thumb portwise. "Ames is shoving his ship, too. And if we don't win, there won't be any *Stardust* left, so far as we're concerned."

"Bad as that, son?"

"It's a one-shot proposition, as you expected. I got cargo by putting the ship up as security. If we don't move it, I'll have to take a market loss, and there's nothing to pay it with. Dad spent all his ready cash putting me through school, and was blasting on pretty thin jets financially. But we've got the cargo and the beacon batteries and a coded identification tape. All we have to do now is beat Ames."

Matthews grunted and vanished into the smelly depths of the engine room. For the fifth time

Rodgers checked course and speed.

The council, he pondered grimly, was getting a good race and a long one. Rhea and Titan had been three days' journey apart when the two ships started. The smaller moon's baleful disk was growing ever larger now against the huge one of Saturn. Rhea, second of the planet's two alien moons, beautiful at this distance, treacherous, deadly. Rodgers was proud that his father had been first deliberately to risk a landing on the green moon, first to establish an understanding with its nonhuman inhabitants, even though he had had to leave a few hours later, in obedience to the grim warning of his radiation detectors.

For Rhea was a moon of death to mankind. The other moons—Titan, Japetus, Thetys, Dione, were normal. A ship caught in Saturn's gravitational net might, with good fortune, land on any of them and await rescue. But Rhea in such a case offered safety with one hand and death with the other. Some theories had it that the green moon was a wanderer from Outside captured by Saturn, whereas the other satellites were born of the planet's own vast bulk.

Rhea was dangerously radioactive. Far harder than X-rays, more penetrating even than cosmic rays, its emanations disintegrated brain tissue after a few hours' exposure. No personal armor, no ship's hull, offered safety from them. Before the beacon was set up, more than one ship had made its last landing on Rhea to become the sarcophagus of its crew. Biological experiments had since set the maximum safe exposure at six hours. Successive exposures had to be at least two hundred thirty hours apart to avoid a cumulative effect. Hence the beacon to warn ships away from this treacherous haven. Hence also the periodic inspection and servicing of the beacon, at a safe interval of two hundred forty hours.

A sudden hooting of the collision indicator roused Rodgers from these thoughts. Three blasts, followed by four shorter ones—the universal interplanetary danger signal. It was followed by the code signal for Rhea. Few spacemen would continue on the course the *Stardust* now held.

He took a reading on the intensity meter, checking its findings against his navigation figures. Twelve hours from Rhea. On the astrogator he deftly set up the coordinates for the first landing crew. The machine rumbled, transmitted a series of signals to the course comparator, and directional jets stuttered spasmodically as they forced the *Stardust* on a new tack. Hardly had she come about when, against the rim of blackness beyond Saturn's disk, Rodgers saw the blue-white blasts of the *Comet's* jets turning her also. He grinned confidently. It would take more than follow-the-leader tactics to beat the *Stardust* down.

A sudden hubbub from beyond the engine room bulkhead brought him up tense. Along with Matthews' voice, shrill above the heavy step of the spaceman's boots on the engine-deck catwalk, rose another and strange voice. The door was flung open. A slight, begrimed figure tumbled in after it. Matthews followed, his broad red face clouded with anger.

"Beggin' your pardon, sir. A bit of trash I found in the after tank compartment." His use of formal address, a bit of sheer showmanship for the benefit of the shivering stowaway, made Rodgers smile inwardly. "Shall I clap him in irons, sir?"

"Presently, Mr. Matthews." Rodgers turned to the man, and at once felt something of Matthews' contempt. The fellow was no spaceman, certainly. A ragged beard, bleary eyes, spindly legs that trembled under every thrust of the ship's directional jets, stamped him as one of those human derelicts common to every port.

"No irons, mister, please. I didn't mean no harm," the man whined. "Just a bit of cop trouble, y'know. Titan was getting too hot for me, so a friend, he tells me how to get away for a bit. I didn't mean no harm, honest, guv'nor."

"You know the rule about stowaways?" asked Rodgers. "Irons in the brig, or the toughest work aboard ship, port to port. Take your pick."

"Oh, I'll work, cap'n. Anythin' you say, mister. I ain't afraid of work. It's drink did me in, nothin' else." The man's manner underwent a subtle change, now that his fate was settled. "You wouldn't have just a wee drop about, would you, admiral?"

Matthews clouted him on the back so that he almost fell on his face. "Get below, ye worthless scum," roared the engine man, "and be thankful if we don't leave ye to rot on Rhea. Drink indeed it is!"

In the very act of getting to his feet the stowaway froze, while the color seemed to drain out of his wizened face. "Rhea? Heaven forbid, we ain't goin' to Rhea?" he croaked.

"And does your ticket say otherwise?" asked Matthews. "Did ye maybe get on the wrong ship by mistake? Maybe it's a luxury liner to Terra ye meant to board all along?"

"No!" yelped the man, plainly terrified. "You ain't for Rhea? Not Rhea, mister? He never said you was for Rhea. Japetus, he said. It ain't too late to head for Japetus, is it?"

"No, sir," snorted Matthews. "We'll change course immediately, now you've ordered it. Get below!"

Rodgers lifted a hand. "Hold a moment, Mr. Matthews. I'd like to know where this man got his misinformation. Surely every soul at Titan port knows the *Stardust* and her run. Who told you Japetus?"

"This friend—we call him Charlie—who told me how to ditch the cops," panted the man. "I ain't long on Titan—I'm from Inside. He wasn't wrong, was he, commodore? You're for Japetus, sure?"

"Rhea," said Rodgers. "Course is set for her now."

The stowaway's face went a trifle whiter under parchment-yellow skin. "He didn't tell me that. He lied, the dirty—"

"What have you done?" snapped Rodgers.

"I don't get you, commodore."

"What were you put on this ship to do? Talk fast. It'll soon be too late to alter course."

The man wilted. "You can't ground on Rhea. Not for your life you can't, guv'nor. It's suicide, that's what."

"Mr. Matthews! We'll have this man in irons after all."

"Aye," grunted the engine man.

"And tend your engines. We've twelve hours to Rhea."

"Aye, sir. Come along, you."

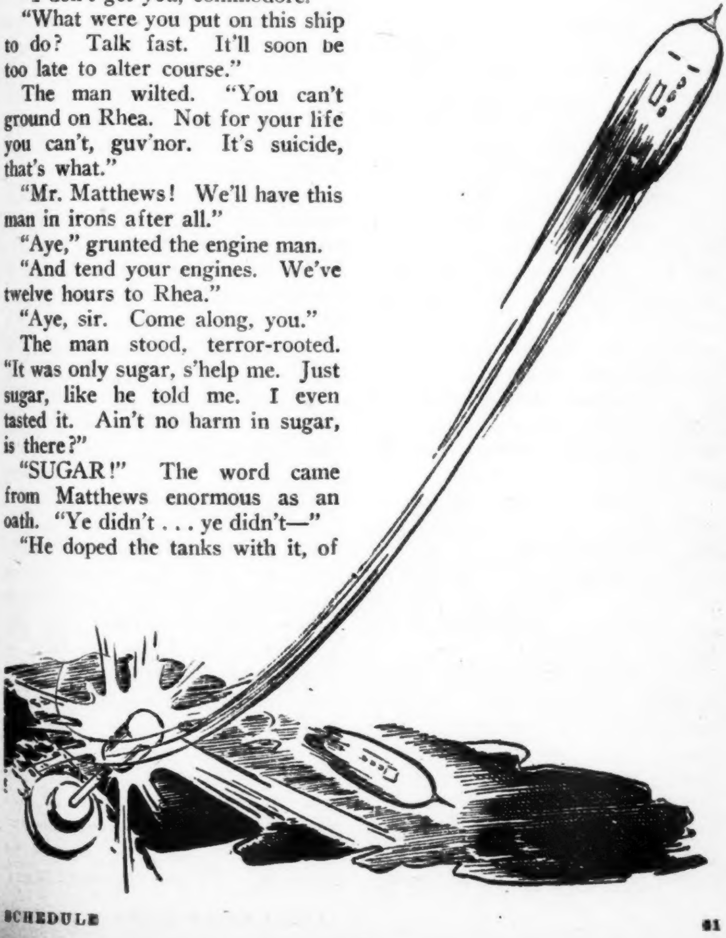
The man stood, terror-rooted. "It was only sugar, s'help me. Just sugar, like he told me. I even tasted it. Ain't no harm in sugar, is there?"

"SUGAR!" The word came from Matthews enormous as an oath. "Ye didn't . . . ye didn't—"

"He doped the tanks with it, of course," said Rodgers. "Didn't you?"

The man nodded dumbly.

"Best take him aft, Mr. Matthews, and find just what tanks were doped. Though I think we can guess."



With one enormous hand clamping the smaller man's shoulder like a vise, Matthews propelled him back into the engine compartment. Alone, Rodgers listened to the muted click of the astrogator and found it a mockery. The *Stardust*, if she held course, was a doomed ship.

Five minutes later the bulkhead door slid open again. If Matthews had been angry before, it was as nothing to the fury that now possessed him. He literally dragged the stowaway after him.

"'Twas the auxiliaries. Our take-off jets will be that crusted she'd never lift off Rhea with them. Fool that I was, I noticed the throat pressure going up when we left Titan, and never thought nothin' of it!"

"You couldn't have helped it if you had," said Rodgers. "Get this man in irons and haul a tube inboard for inspection."

"He never told me what it would do," groaned the stowaway. "Said it would just slow you down, so another ship could beat you to Japetus. Not nothing about Rhea."

"Who was he?" growled Matthews. "You'll tell or I'll break your back, you sniveling scum of a—"

"He doesn't know," interrupted Rodgers. "Trust Ames to work through three or four agents. This man probably saw only the last of them. You remember he said he's new to Titan. It's a cold trail."

Matthews strode off with his prisoner, the man still pleading that course be changed. While Saturn wheeled in the ebony heavens and the astrogator continued to click out its computations, Rodgers bitterly reviewed the situation.

What the report on the high-emission take-off tubes would be he was only too sure. These jets, burning special fuel with a high exhaust velocity, were vital at take-offs and landings. Sugar in that fuel would have deposited inch-thick layers of stone-hard carbon in the refractory throat linings during the take-off run from Titan. Such deposits cut the efficiency of the jets by ninety percent.

Seizing pad and stylus, he made hasty calculations. They could land on Rhea by reversing the artificial gravity screens so as to reinforce the few jets the engine crew could scrape clear in the time remaining. To use the clogged tubes was to risk an explosion that would split the ship open from bow to stern. A landing with twenty clear jets and the screens was feasible—but deadly. The landing blasts could foul the cleared tubes anew, and in the six hours men could endure on Rhea they could clean no more than ten or twelve jets at most—far too few to lift the ship again. They would be marooned twelve hours or more on Rhea—where seven meant death.

It was checkmate, and Ames had won.

One look at Matthews' face, when the engine man returned, was enough to confirm all forebodings.

"Clogged to the gills," he growled. "There's forty hours' work ahead of us to clean the lot. But the crew's started and we can land on twenty tubes with the screens helpin'."

"He's got us," said Rodgers bitterly. "It's what he planned—all foolproof from his end. If he grounds first, we've no call to land at all and can be expected to put back for Titan. Even if we complain of sabotage there, he can afford to laugh it off. All we'll have to offer in evidence is our word—we'll have to clean the tubes again before landing. The fellow you caught can't testify against Ames because he doesn't even know him."

Matthews shook his grizzled head.

"I ain't much on logic, son, and ye make it sound tough. Only thing for us, as I see it, is to make groundfall ahead of Ames and beat him to the beacon and the bismullah."

"I'm afraid it's not that simple."

"Afraid? What kind of talk is that, son? Where's your fighting spirit? We've got to. Them Rheans don't know a good ship from a bad one—those your dad first traded with aren't alive now, and the critters just swap like they been taught. One time when the *Stardust* was docked for repairs, your dad chartered an old scow. The Rheans loaded it and took off their trade goods happy as you please. They'll trade with Ames as easy. We've got to get down first. Fellow who wins the beacon contract gets the cargo too. And we can do it."

"Maybe," said Rodgers soberly. "But we'll never leave Rhea alive if we do. We can land on twenty tubes and the screens in a pinch. But we can't take off on the few your crew can clean while we're grounded."

"We'll have six hours," Matthews pointed out gruffly. "I'll have twelve tubes ready for you by then—thirteen maybe."

"It's not enough. Even with the gravities and the cruising jets helping, we'd need at least twenty tubes to lift. Here are the figures."

"Figures! Pah!" spat Matthews. "We don't run ships by the book out here, son. It's by blood and sweat, by the last drop of sky juice and the last microvolt in our capacitors and the last thump of our engines. That's how your dad did it and that's how I navigate. We have to try, don't we? Didn't ye just tell me what happens if we turn back to Titan like licked pups?"

"And what happens if we beat Ames to the beacon?" asked Rodgers. "He'll turn back to Titan without grounding, of course—why should he, when we've won? Back in port he'll pretend to be a good loser—and to be surprised, in a sportsmanlike way, when we never reach Titan again. After that he'll naturally take over the run anyway. We've got to face the fact that, once we make Rhea, we've a dead ship."

At that Matthews swore, roundly and vividly. "The *Stardust's* no dead ship and never will be so long as I've a pint in her tanks. Sure, and what d'ye plan to do if not to lick Ames?"

Rodgers hesitated, a slow flush creeping up his cheeks. "The first thing any master's supposed to do—restore his ship to spaceworthy condition."

The engine man smacked the chart table with his palm so that the instruments shook in their racks. "Ye can't do that, son. 'Tis a time to take a risk. Once Ames lands, he gets cargo. Won't be another batch of cargo for at least fifty hours after that, because your dad learned it takes the critters that long to collect and cure the stuff. If ye land an hour after Ames, ye'll take off empty handed. No contract *and* no bismullah, and the *Stardust* lost to ye when we get back."

The old man paused to look at Rodgers shrewdly.

"Course, maybe you're figurin' on landin' sixty, seventy hours after Ames. Maybe the Rheans would have cargo—and maybe not. We don't know how soon they start collectin' a new batch after a trade visit. All we know is they've got a new batch every trip—always have had, at least. Ye might get cargo that way now and then, but it wouldn't do ye no good. Supposin' even we're lucky enough to get half the bismullah while Ames gets the other half—a cargo every other trip, maybe. Then what?

"Why," the engine man continued, "Ames would have the beacon contract, and that's eighty percent of his expenses. He'd only need to make twenty percent on the bismullah to break even. All ye'd have would be the same amount of bismullah—if ye're lucky—to pay all your expenses."

"Hold on, now. A full cargo of bismullah's enough to pay a profit on any trip, even without the contract," interposed Rodgers.

"Won't be with Ames in the picture," grunted the engine man. "Bismullah's a luxury trade right enough—a radioactive rare earth that's used in a lot of fancy beauty creams ought to fetch a fancy price. But Ames'll undersell you as long as he has to, and the beacon contract will let him do it easy. He'll break ye, son. That's why it's all or nothin'."

Rodgers stared thoughtfully before him. A new clicking of the astrogator broke in on his reverie. He stepped to the machine and fingered its keys. The *Stardust* responded with a new kick of directional tubes.

"Now you're blastin' on all jets, son," said Matthews with a grin. "Set her down and let the old girl get you off when the time comes. She always has."

"Not this time," said Rodgers quietly. "I've altered course."

Under his space tan the blood seemed to recede from Matthews' face. His breathing was suddenly loud in the tiny navigation cubby, and his broad figure seemed to take on a stoop. He strode to the bulkhead door, but even as he touched it he turned.

"It ain't what your Dad would have done. But maybe you're different. Guess you play things the safe way, like Ames figured you would."

The other flushed. "Master's regulations forbid endangering crew or ship by landing on Rhea unless all take-off tubes are in order."

Deliberately the engine man spat on the deck. "Think we're a blasted bunch of passengers? We'd have took our chances—with any skipper willing to take his."

He swung back to the door.

"Mr. Matthews."

The engine man looked back, scowling.

"Regulations also require that inoperative tubes be repaired at once against possible emergencies. You'll keep your men at that detail."

"Aye. But I never dreamed Ben Rodgers' son would turn out to be a rule-book polisher," said Matthews bitterly. "Shows how wrong a man can be."

He surveyed Rodgers critically.

"Or maybe I've been even wronger. Blood don't always tell. It takes guts to pilot the Rhea run, to ground trip after trip on a moon where you're as good as dead after six hours. Maybe you never had that kind of guts. Maybe, Ames or no Ames, jets or no jets, you never would have set keel on Rhea anyway—because you ain't got what it takes."

He slammed the bulkhead door behind him so that the clang of it echoed funereally through the now silent ship.

Following the end of the second oiler's story, the hiss of the *Medusa's* circulation system resumed its omnipresent sway. The oiler himself seemed lost in contemplation of the lumintubes.

"You gotta feel sorry for the kid," the subthird said of a sudden. "So he was yellow, maybe, but with the cards stacked that way, who wouldn't be?"

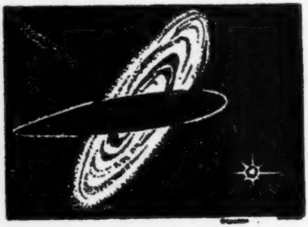
"Takes more guts to go back and take your lickin' sometimes," put in an engine hand, "than to toss in your chips for keeps."

The first oiler spat accurately into the refuse well. "Yellow he was, for my money." He eyed the second oiler speculatively.

It was the subthird who saw how things stood and tried to smooth them. "You talk too much, Jennings. So that's your opinion and ours is ours. Don't forget the kid would have been risking every man aboard, not just his own neck. Take your heroes. I'll stick to a skipper who gets me back alive to spend my port money.”

The engine man was bound to hear the whole story. “It couldn’t have been that Ames had a bit of trouble and never got off Rhea himself after all?”

“No,” said the second oiler curtly, and made a long business of lighting his pipe again. “He grounded nice as you please, while the *Stardust* swung around ten hours off, and put his signal on the beacon, and changed the batteries. The Rheans had been without salt and sodium a time, and the bismullah was waiting—a full cargo. When he took off and passed the *Stardust*, she was still drifting idle while her engine crew scraped jets. What could you expect? But I wouldn’t call Rodgers yellow at all.”



A gleam of understanding grew in the first oiler’s gray eyes. “You know an almighty lot about this Rodgers,” he said softly. “Almost as if *you’d* been aboard the *Stardust* that trip.”

The subthird caught his eye, but the oiler wouldn’t stop. “Almost as if, it seems. Maybe you were. Sure you were. *You’re Rodgers, ain’t you?*”

The subthird got up and placed himself between the two men.

“Course not. What’s got into you, Hodges? Better forget the whole thing. Time we turned in.”

“Sit down, Peters,” urged the second oiler. “Nobody’s calling me yellow.”

“Now hold on,” urged the subthird. “Just a mistake, that’s all. Hodges didn’t mean nothing.”

“No matter if he did,” grunted the second. “I’m not Rodgers. I’m Ames.”

General silence followed this announcement, its essence finally voiced by the engine hand.

“Now you ain’t makin’ sense, mister.”

The second oiler swore softly. “Ain’t I? You ought to read the articles you sign. Who’s chairman of the fleet that owns this ship and twenty more? Not anybody called Ames. James Rodgers. Bismullah’s a dead trade now, but it laid the keels of half this fleet.”

“That don’t make sense either. Ames got the beacon contract and the bismullah—and now he’s second oiler on a Rodgers ship.” The subthird shook his head. “ ’Tain’t reasonable.”

“Served me right,” said Ames. “I was young and tough and played it dirty. Got what was coming to me.” He sucked hugely on the pipe and grinned. “Often think I was a fool not to see Rodgers’ game. Then I tell the whole yarn to somebody else and when they don’t see it either, I feel better.”

“But you did get the contract *and* the bismullah.”

“First trip, sure,” nodded Ames.

"But that was the last time. I never got another cargo—just made one trip after another servicing that blasted beacon. Like having a tiger by the tail, that was. I couldn't let go, because the government contract called for big cash penalties if I was a day late any trip. Couldn't change my schedule. Couldn't call off the contract without losing my shirt. Couldn't get another ship because my credit dropped soon as I started coming back to port with empty holds. I lost just enough each trip, over and above the eighty percent of expenses the contract paid, to get in the red deeper and deeper. Rodgers wrapped my own schedule around my neck and strung me up by it."

The subthird suddenly swore, like a man tormented beyond endurance.

"What in the name of seventeen blasted space devils did he *do?*" he roared.

Ames took a deep draw, enjoying the moment. "He wasn't yellow, lying off Rhea like that. Just smart. He cleaned all the tubes so he'd be able to take-off without any risk. Then he landed on Rhea—exactly two hundred thirty hours after I had."

"I was still five hours out from Rhea on my second trip then, never dreaming what he was up to. He landed nice as you please, swapped his cargo for all the bismullah the Rheans had worked up since I'd been there, and took off. Wasn't a scrap of bismullah for me when I landed a couple of hours later. The Rheans just looked kind of funny at us and crawled off. All we could do was service the beacon. Then we couldn't ground on Rhea again for two hundred thirty hours, and anyway the contract called for us to come two hundred forty hours later. Rodgers made his second landing two hundred thirty hours later and loaded bismullah again. We came—and serviced the beacon."

"Mean to say you never got cargo after that?" asked the subthird.

"Not once. That was the story from then on. I serviced the beacon, lost twenty percent of my expenses each trip, and Rodgers got the bismullah. The government wouldn't touch him—said the bismullah was none of their business and they couldn't interfere with free trade. But they wouldn't let me change schedule. Told me to work it out with Rodgers. Finally I went and offered him the contract for free. He wouldn't take it without my *Comet.*"

Ames frowned at his pipe. "It still burns me up. He gave me a fair price, and I might still have a small ship if I hadn't run into bad luck in a hot spot on Luna. All's fair, as I'll admit, and I'd have done just what he did.

"But it burns me up all the same. Because why, of all the jobs he could have found for her, did he have to put my *Comet* on the Japetus run—hauling fertilizer?"

THE END.

***There were three kinds of telepathic Baldies in the world: the sane, well-adjusted; the completely insane ones, mutants spoiled in the making—and the paranoids. And those last were deadly . . .***

# Three Blind Mice

### by LEWIS PADGETT

Illustrated by Orban

Under the helicopter, disturbed by the hurricane downblast, the lake was lashed to white foam. The curving dark shape of a bass leaped and vanished. A sailboat tacked and made toward the farther shore. In Barton's mind there flamed for an instant a ravening madness of hunger and then an intensity of pure ecstasy, as his thought probed down into the depths of the waters and made contact with some form of life in which there was instinct, but no reason—only the raging avidity of life-lust that, after fifteen years, was so familiar to him now.

There had been no need for that purely automatic mental probing. In these calm American waters one found no sharks, no crocodiles, no poisonous sea snakes. It was habit alone, the trained alertness that had helped to make David Barton expert in his field, one of the few vocations available to the minority of telepathic Baldies. And after six months in Africa, what he wanted most of all was not—*contact*—but something to calm his psychic tension. In the jungle a Baldy can find a communion with nature that out-Thoreau's Thoreau, but at a cost. Beneath that pagan spirit of the primeval beats the urgent pulse of strong instinct: self-preservation almost without reason. Only in the paintings of Rousseau that had survived the Blowup had Barton felt the same vivid, almost insane passion for life.

*Where men are weary of green*
*wine,*
*And sick of crimson seas—*

Well, he was back now, not far from his grandfather's birthplace near Chicago, and he could rest for a while. Geneology, for Barton as well as for all other Baldies, started with the Blowup and the hard radiations that had smashed the cities of the world and begun what amounted to a new race. And, perhaps, a damned race.

His hands moved over the complicated controls, sending the copter smoothly up, as though by that action he could escape what was inescapable. You lived, for the most part, on the earth, and if you happened to be a telepath, well, there were of course advantages as well as disadvantages. Nobody lynched Baldies any more, of course. Fairly secure, almost accepted, in their cautious self-effacement—italicized by the wigs they invariably wore—they could find jobs and a pattern for living. Specialized jobs, naturally, which must never involve too much power or profit. Jobs in which you turned your specialized talent to the betterment of the social unit. Barton was a naturalist, a collector of big and little game. And that had been his salvation.

Years ago, he remembered, there had been a conference, his parents, and a few other Baldies, drawn together by the deep, sympathetic friendliness and understanding that always had welded telepaths. He could still vividly recall the troubled patterns of thought that had ebbed and flowed in the room, more clearly than the way their faces had looked. Danger, and a shadow, and a desire to help.

*. . . Outlet for his energy . . . no scholar . . . misfit unless—*

*—find the right job—*

He could not remember the words, only the absolute meanings, with their significant colorations and shadings of implication, those and the—the name-symbol by which the others thought of him. To them he was not Dave Barton. Their thought-references to him personally, while different to each mind, had always the kernel of individual meaning that belonged to him alone, of all the people in the world. The name that a candle flame might have, secret and unuttered. His alone.

And because of this, and because each Baldy *must* survive and adjust, for the ultimate good of the racial mutation, they had found the answer. It was all right for non-Baldies to be reasonably swashbuckling; everyone wore daggers and duelled nowadays. But the telepaths themselves lived on borrowed time. They existed only because of the good will they had created. That good will had to be maintained, and it could not be done by arousing antagonism. No one could be jealous of a mild-mannered, studious semantic expert, but a d'Artagnan could be envied—and would be. An outlet, then, for the boy's curiously mixed inheritance, his blood from pioneering, trail-blazing ancestors mixed with the cautious Baldy strain.

So they had found the answer, and Baldy did his pioneering in the jungles, matching his keen mind against the brute savagery of tiger and python. Had that solution not been reached, Barton might not have been alive now. For the non-Baldies were still wary, still intolerant.

Yet he was no extrovert; he could not be. Inevitably he grew tired of the ceaseless symphony of thought that rolled like a living tide even in the deserts and the seas. Erecting a mental barrier wasn't enough; behind that protective wall beat the torrents of thought, and they were sensed. Only in the upper air was there escape for a while—which explained why all Baldies were expert helicopter pilots.

The plane lifted, rocking a little in the wind. Beneath Barton the lake was dime-sized and dime-colored. Around its borders grew, more thickly than it had fifty years before, the Limberlost forests, a swampy wilderness where the small roving bands of malcontents migrated constantly, unable to adjust to communal life in the hundreds of thousands of villages that dotted America, and afraid to unite. In union there was death. As long as atomic bombs were easy to make, as long as they were cached secretly by every town, the balance of power could not tip dangerously in any one direction. And that was fine for everyone but the malcontents. They were antisocial, and probably would simply die out eventually.

The lake became a pinpoint and vanished. A freighter copter, with its string of gliders, whipped westward below, laden perhaps with cod from the Great Banks towns, or with wine grapes from the New England vineyards. Names had not changed much as the country changed. The heritage of language was too strong for that. But there were no towns named New York, or Chicago, or San Francisco; there was a psychological taboo there, the familiar fugue that took the form of never naming one of the new, small, semi-specializing villages after the cancerous areas of desolation once called New Orleans or Denver. From American history, thence world history, the names came—Modoc and Lafitte, Lincoln, Roxy, Potomac, Mowhasset, American Gun, and Conestoga. Modoc was a publishing center; Lafitte, on the Gulf of Mexico, shipped the delicate-fleshed porgie and pompano to Lincoln and Roxy, in the agricultural belt; American Gun turned out farm equipment, and Conestoga, from which Barton had just come, was in mining land. It also had a temperate-zone zoo, one of the many that Barton serviced from Puget to Florida End.

He closed his eyes. Baldies by necessity were socially conscious, and when the world lay spread out maplike below, it was difficult not to visualize it speckled with the heads of colored pins; very many black ones, and a very few white ones. Non-Baldies and Baldies. There was something to be said for intelligence, after all. In the jungle, a monkey with a red flannel coat would be torn to pieces by its undressed colleagues.

The blue, empty wastes of air were all about Barton now; the torrents of world-thought had lessened to a faint, nearly imperceptible beat. He closed the cabin, turned on air and heat controls, and let the copter rise. He lay back in the cushioned seat, a distant alertness ready to galvanize his hands into action if the copter should go into one of its unpredictable tantrums. Meanwhile he rested, alone, in a complete silence and vacancy.

His mind was washed clean. Pure calm, a sort of Nirvana, soothed him. Far below the turbulent world sent vibrations jangling through subetheric levels, but few radiations reached this height, and those did not disturb Barton. His eyes shut, utterly relaxed, he looked like someone who had, for a while, forgotten to live.

It was the panacea for abnormally sensitive minds. At first glance, few took Barton for a Baldy; he wore his brown wig close-cropped, and his years in the jungle had made him almost unhealthily thin. Baldies, naturally self-barred from competitive athletics except among themselves, were apt to grow soft, but Barton was not soft. Outguessing predators had kept him in good trim. Now he relaxed, high above the earth, as hundreds of other Baldies were resting their taxed minds in the blue calm of the upper air.

Once he opened his eyes and looked up through the transparent ceiling panel. The sky was quite dark, and a few stars were visible. He lay there for a while, simply watching. *Baldies,* he thought, *will be the first to develop interplanetary travel. Out there are clean new worlds, and a new race needs a new world,*

But it could wait. It had taken a long time for Barton to realize that his race, not himself, was important. Not until that knowledge came to a Baldy was he really mature. Until then, he was always a possible potential danger. Now, though, Barton was oriented, and had found, like most Baldies, a compromise between self and race. And it involved, chiefly, development of the social instinct, and diplomacy.

Several hours had gone past quickly. Barton found a packet of food concentrate in a compartment, grimaced at the brown capsules, and stuffed them back in their place. No. While he was back in America, he wanted the luxuries of civilization. In Africa he had eaten enough concentrate to blast his taste buds. That was because certain game was psychically repugnant to him, after contact with the animal minds. He was not a vegetarian; he could rationalize most of the feeling away, but—for example—he could certainly never eat monkey.

But he could eat catfish, and anticipated the crisp flakiness of white, firm flesh between his teeth. This was good cat country. There was a restaurant in downtown Conestoga that Barton knew, and he headed the helicopter toward the airfield nearest to it, circling the village itself to avoid raising dust storms by his low altitude.

He felt refreshed, ready to take his place in the world again. There were, as far as he knew, no Baldies living in Conestoga, and it was with surprise—pleasant surprise—that he felt a thought probe into his mind. It held question.

It was a woman's thought, and she did not know him. That he could tell by the superficialities of the identity-queries. It was like the outspread fingers of a hand reaching out gently in search of another hand that would interlock with its grip. But the searcher's cognizance of Barton as a personality was lacking. No, she did not know him. She knew of him, probably through—Denham? Courtney? He seemed to recognize the personality-keys of Denham and Courtney sifted through her query.

He answered her question. *Available. Here. A courteous, friendly greeting, implying—you are one of Us; a willing desire to help.*

Her name, Sue Connaught, with its curious shadings of how Sue Connaught realized her own identity—an indescribable key thought that could never afterwards be mistaken. The mental essence of pure ego.

She was a biologist, she lived in Alamo, she was afraid—

*Let me help.*

*Must see you)*
*(Vital urgency*
*Danger, eyes watching secretly*
*(Beasts around—*
*Sue Connaught*

*Danger—now?*

The complicated thought meshed and interlocked as he increased his pace.

*Utterly alone)*
*("I" of all the world knowing—*
*Most urgent secrecy*
*(Beasts—"I" am in zoo, waiting*

*Hurrying to you; my mind is with yours; you are one of Us, therefore never alone.* Faster than words, the thoughts raced. Oral or written sentences slow the transmission of mental concepts. Adjectives and adverbs convey shades of meaning. But between telepaths complete ideas move with light-speed. In prehuman times simple meanings were completely transmitted by grunts. As language developed, gradations were possible. With telepathy, a whole universe can be created and—conveyed.

Even so, common denominators are necessary. The girl was dodging some vital issues, afraid to vasualize it.

*What? Let me help!*
*(Even here, danger of Them*
*Wariness) Pretend utterly all is normal*
*(Use oral speech until—*

Her mind closed. Puzzled, Barton automatically raised his own barrier. It is not, of course, ever possible to shut one's mind completely away from the persistent probing of another telepath. At best one can only blur the thought wave by superimposing others upon it, or by submerging the salient ideas deep down in the formlessness of nonthought. But they are resilient things, thoughts. Not even the trained minds of Baldies can keep them submerged very long—the very fact of concentrating to keep them down maintains their wavering shapes cloudily in the background of the mind.

So a barrier can be raised, of willful obscurity or deliberate confusion—reciting the multiplication tables is one evasion—but not for very long or very efficiently. Only the instinctive politeness which a Baldy learns with his alphabet makes the raising of a barrier the equivalent of blanking. A barrier's efficiency is mostly in the mind of the other man, not one's own—if he be a proper telepath.

Barton, like most Baldies, was. He "looked" away immediately as Sue Connaught's thoughts veered from contact with him. But he was the more eager to meet her now and read in her face, if he could, what convention forbade him to read in her mind. The gates of the zoo lay open before him.

Barton stepped through them, noticing a small crowd, mostly out-villagers who had helicoptered over to see the new acquisitions he had brought.

But, despite barriers, he could, as always, sense a Baldy here, and he let his instinct guide him to where a girl, slim in slacks and white blouse, was standing by a railed inclosure, held there by some fascination. He sent his thought forward, and it was met by a sudden, desperate warning.

*Barrier! Barrier!*

He reacted instantly. He stepped up beside her, looking beyond the railing, into the enormous tank where a torpedo body moved lazily. He knew that Sue Connaught had looked into the shark's mind, and had seen something there that held a tremendous significance to her.

"So you don't like it," he said. There was no danger in speech; to a telepath, with barrier raised, it was more secret than thought.

"No," she said. "I suppose it takes conditioning."

"But you're a biologist."

"Rabbits and guinea pigs. Even those make me blush sometimes. But—carnivores."

"Tackle a weasel sometime," he suggested. "It's pure insanity.

Come on." He led her out of the crowd, toward the terrace where canopied tables were scattered. "Have a cocktail?"

"Thanks." The glanced back at the shark's tank. Barton nodded; it could be bad, if one wasn't used to it. But he was used to it.

"Shall we go somewhere else?" he asked, pausing in the act of drawing out a chair for her. "A zoo can be pretty uncomfortable if you aren't—"

"No. It's safer here. We've got to talk, and we can do it pretty freely in a place like this. None of Us would come here for pleasure." With her mind she "glanced" around at the encircling madness of beast-thoughts, then blurred the surface of her mind again as a protection and smiled at Barton appealingly.

They had met, as all Baldies do, upon a footing of instant semi-intimacy. Nontelepaths may take weeks of friendship to establish a knowledge of one another's character; Baldies do it automatically at first contact, often before they meet at all. Often, indeed, the knowledge formed in first mental meeting is more accurate than later impressions colored by the appearance and physical mannerisms of the telepaths. As non-Baldies, these two would have been Miss Connaught and Mr. Barton for awhile. But as telepaths they had automatically, unconsciously summed one another up while Barton was still in the air; they knew they were mutually pleasant in a contact of minds. They thought of one another instantly as Sue and Dave. No non-Baldy, eavesdropping on their meeting, would have believed they were not old friends; it would have been artificial had the two behaved otherwise than this, once their minds had accepted each other.

Sue said aloud, "I'll have a Martini. Do you mind if I talk? It helps." And she glanced around, physically this time, at the cages. "I don't see how you stand it, even with your training. I should think you could drive a Baldie perfectly gibbering just by shutting him up in a zoo overnight."

Barton grinned, and automatically his mind began sorting out the vibrations from all around him: the casual trivialities from the monkeys, broken by a pattern of hysteria as a capuchin caught the scent of jaguar; the primal, implacable vibrations from the panthers and lions, with their undertone of sheer, proud confidence; the gentle, almost funny radiations from the seals. Not that they could be called reasoning thoughts; the brains were those of animals, but basically the same colloid organism existed under fur and scales as existed under the auburn wig of Sue Connaught.

After a while, over Martinis, she asked, "Have you ever fought a duel?"

Barton instinctively glanced around. He touched the small dagger at his belt. "I'm a Baldy, Sue."

"So you haven't."

"Naturally not." He didn't

trouble to explain; she knew the reason as well as he did. For Baldies could not risk capitalizing on their special ability except in very limited cases. A telepath can always win a duel. If David hadn't killed Goliath, eventually the Philistines would have mobbed the giant out of sheer jealousy. Had Goliath been smart, he would have walked with his knees bent.

Sue said, "That's all right. I've had to be very careful. This is so confidential I don't know who—" Her barrier was still up strongly.

"I've been in Africa for six months. Maybe I'm not up with current events." Both of them were feeling the inadequacy of words, and it made them impatient.

"Not current . . . future. Things are . . . help from . . . qualify—" She stopped and forced herself into the slower grammatical form of communication. "I've got to get help somewhere, and it's got to be one of Us. Not only that, but a very special kind of person. You qualify."

"How?"

"Because you're a naturalist," she said. "I've looked the field over, but you know what sort of work We usually get. Sedentary occupations. Semantics experts, medical and psychiatric internes, biologists like me, police assistants—that came closer, but I need a man who . . . who can get the jump on another Baldy."

Barton stared and frowned. "A duel?"

"I think so," she said. "I can't be sure yet. But it seems the only way. This must be completely secret, Dave, absolutely secret. If a word of it ever got out, it would be . . . very bad for Us."

He knew what she meant, and pursed his lips in a soundless whistle. That shadow always hung over every Baldy.

"What is it?"

She didn't answer directly. "You're a naturalist. That's fine. What I need is a man who can meet a telepath on slightly more than equal terms. No non-Baldy would do, even if I could talk about this to a non-Baldy. What I've got to get is a man with a fast-moving mind who's also trained his body to respond faster than instantly."

"Uh-huh."

"There weren't many," she said. "Even when minds move at the same speed, there's always a fractional difference in muscular response. And we're not too well trained. Games of competitive skill—"

"I've thought of that," Barton said. "More than once, too. Any game based on war is unsuitable for Us."

"Any game in which you face your opponent. I like golf, but I can't play tennis."

"Well," Barton told her, "I don't box or wrestle. Or play chess, for that matter. But skip-handball—have you seen that?"

She shook her head.

"The backboard's full of convolutions; you never know which way the ball will bounce. And the board's in sections that keep sliding erratically. You can control the force, but not the direction. That's one way. It's something new, and naturally it isn't advertised, but a friend of mine's got one at his place. A man named Denham."

"He told me about you."

"I thought so."

"Uh-huh. For fifteen years you've been catching everything from tigers to king cobras. That takes good timing, the way you do it. Any man who can outguess a king cobra—"

"Watch your barrier," Barton said sharply. "I caught something then. Is it that bad?"

She drew a shaky breath. "My control's lousy. Let's get out of here."

Barton led her across the zoo's main area. As they passed the shark's tank he sent a quick glance down, and met the girl's eyes worriedly.

"Like that, eh?"

She nodded. "Like that. But you can't put Them in cages."

Over catfish and Shasta white wine she told him—

You can't put Them in cages. Shrewd, dangerous, but very careful now. They were the middle group of the three telepathic assortments. The same mutation, but . . . *but!*

The hard radiations had been plain dynamite. When you implant a completely new function in the delicate human brain, you upset a beautiful and long-standing balance. So there had been three groups: one was a complete failure, thrust into the mental borderland of insanity, dementia praecox and paranoia. Another group, to which Sue Connaught and Barton belonged—the vast majority—were able to adjust to a nontelepathic world. They wore wigs.

But the middle group was paranoid—and sane.

Among these telepaths were found the maladjusted egotists, the ones who for a long time had refused to wear wigs, and who had bragged of their superiority. They had the cunning and the utter self-justification of the true paranoid type, and were basically antisocial. But they were not mad.

And you can't put Them in cages. For they were telepaths, and how can you cage the mind?

They finished with Brazilian chocolate cake, demi-tasse and Mississippi liqueur, made by the monks of Swanee monastery. Barton touched his cigarette tip to the igniter paper on the pack. He inhaled smoke.

"It's not a big conspiracy, then."

"These things start small. A few men—but you see the danger."

Barton nodded. "I see it, O.K. It's plenty bad medicine. A few paranoid-type Baldies, working out a crazy sabotage scheme— Tell me a little more first, though. For instance, why me? And why you?"

To a nontelepath the question might have been obscure. Sue raised her brows and said, "You,

because you've got the reflexes I spoke of and because I had the luck to find you before I got desperate enough to look for a substitute. As for me"—she hesitated—"that's the oddest part. No one could have stumbled onto them except by accident. Because telepathy, of course, isn't tight-beam. It's a broadcast. Any receptive mind can pick it up. The minute enough people band together to make a city, *that's* noticeable. And the minute Baldies get together and form any sort of organization, that's noticeable to. Which is why paranoids never made much trouble, except individually. Banding together would have meant running up a flag—one that could be seen for miles."

"And so?"

"So they've got this special means of communication. It's secret, absolutely unbreakable code. Only it isn't merely code. Then we could detect and trace down, even if we couldn't break it. This is telepathic communication on an entirely new band, one we can't even touch. I don't know how they do it. It might be partly mechanical, or it might not. Children have a higher perceptive level, but we can catch their thoughts. This is mental ultraviolet. Do you realize the implications?"

Smoke jetted from Barton's nostrils. "Yeah. It wrecks the balance of power—completely. Up to now, decentralization has kept peace. Nobody dared band together or get too big for their boots. They could be detected.

But these bichos are wearing invisible cloaks." His hand clenched. "It could become world-wide! The one form of organization we can't fight!"

"It's got to be fought," she said. "It's got to be smashed. And fast, before anyone suspects. If non-Baldies ever find out, there'll be a wave of anti-Baldism that could wipe Us out. If that should happen, people wouldn't stop to sort out the social and the antisocial groups. They'd say, 'We've been nursing a viper, and it's got fangs. Kill 'em all.'"

Outside the window a man on horesback clattered past, hoofbeats making an urgent rhythm in Barton's brain.

"How many are there?"

"I told you it's just beginning. Only a few more. But it can spread. I suppose the immediate difficulty is in their training neophytes in their special trick telepathy. That's why I think it must be psychically self-induced. Gadgets can be detected. And mobility would be necessary; they'd never know when they had to get in touch with each other. You can't pack around a big gadget."

"You could camouflage it," Barton said. "Or it might be pretty small."

"It might," she said, "but there's this little girl—Melissa Carr. She tapped their wave without a gadget. She must be some mutant variant."

"Melissa Carr?" echoed Barton. "Where does she come in?"

"Oh, I haven't told you. She's my contact. I've been in touch with her off and on for a week or so, but it was only yesterday that she let slip, very casually, what she'd learned on that special thought band."

"She isn't one of them, then?"

"I'm sure not. It's very odd. Even the way she reached me first—" Sue had been dressing for a party, and the tentative fingering question had crept into her mind. "It was like Cinderella, somehow. I could feel the pleasure she took in the dress I was wearing, a Mozambique model, and the Karel bag. She strung along with me mentally all evening. And after that—" After that communication had been established. But it had been days before Melissa spoke of the telepathic signals she had inadvertently tuned in on.

"She guessed what they meant, but she didn't seem much impressed by the danger. I mean, it didn't strike her that something ought to be done. There's some mystery about Melissa; sometimes I've even thought she might have been a member of the group once, and pulled out. Sometimes she won't answer my signals at all. But now that she's told me about this—Faxe—I think I've convinced her of the danger. Sam Faxe. He's one of the paranoids, and from what I've learned, he's trying to sabotage some experiments in Galileo."

"Why?"

"That's what I don't know. Apparently the paranoids are so familiar with their basic plan that they don't need even to think about it.

Their thoughts deal with immediate action. And always on that special wave length we can't catch. Only Melissa, as far as I know, can get it, and she must have been born receptive."

"Some are," Barton agreed. "Mutants certainly vary a lot, far more than nonmutants. As for this long-term scheme, you know the paranoid type. They figure Baldies were made to rule the world. They look on ordinary humans as a lower species. And if they're trying to sabotage experiments, that's significant. I wonder what sort of experiment this Galileo business is?"

"I don't know," Sue said. "Melissa's very shaky on technology."

"I can find out through Denham. He lives in Galileo."

"That's where I met him. But maybe you can get more out of Melissa than I can. It isn't wise to"—she hesitated, substituting a familiar word for the unimaginable mental term—"telepath her too much, but it's necessary, of course. If you feel any probing, sheer off right away."

"Has there been any?"

"No. Not yet. But we *must* keep in the dark."

Sue hadn't asked Barton if he would help; she knew that he would. Preservation of the race had been implanted in every Baldy, though in the paranoid type it had been warped and distorted. Now Sue's mind reached out, searching, questioning, seeking the lock to fit her key. And almost immediately the answer came.

It was like one hand drawing two others together, Sue mentally introducing Melissa Carr to Barton. He felt something fumble, shy and almost gauche, and then they—locked. He sent out friendliness and warm assurance. Instantly he was conscious of a strong femininity that amounted almost to sexual attraction. Half clear, half clouded, he sensed what Melissa Carr meant to herself: the intangible consciousness of living ego, different in each individual, and the softness of curling hair—hair? Wig—and the softness of a mouth against fingers drawn gently across them. A demure withdrawal that had in it shades of color and scent, and then something that was the equivalent of a curtsey, purely mental, and with an oddly old-fashioned flavor. After that, he knew he could never mistake Melissa Carr's mind for that of another Baldy.

*This is Dave Barton, Melissa.*

*Recognition and pleasure-shading. A question: trust? So much danger—*

*Utter trust, yes—strong affirmative.*

*Urgency* {
*Many—(different)—messages coming strongly*
*Shadow of menace of Sam Faxe*
*A growing explosive stain in Galileo*
*Cannot speak—another symbol for speak—long*
*Possible personal danger*

And all these gradations of meaning at once, three minds interlock-ing like a color wheel, focusing to the central white spot of revelation and truth. There were no barriers, as in oral conversation. Like light the thoughts intermeshed and wove in question, answer, and statement, and despite the concentration, all three had time for the more intimate shadings that took the place of tonal values. It was the capacity for such rapport that made round-table debates so popular among Baldies; the logical and aesthetic play of minds that could ultimately resolve into an ecstacy of complete common awareness. Physically there was no polygamy among Baldies, but mentally the social group had expanded, lending an additional depth and richness to their lives.

But this was merely a hint of complete rapport. Barton was searching for clues in what Melissa told him. He was no technician either, so he was going at it from another angle; that of the naturalist, trained in probing protective coloration, skilled in unraveling the predator's tangled tracks.

*How many?*

*Three.*

*No more?*

*Three—and images of Galileo and other towns, symbols of names and identities. A feeling of shadowy communion, links of hatred—*

And suddenly, in her mind, he sensed something curiously, disturbingly familiar. He did not know what it was. But momentarily it broke the smooth flow of communication, while he searched.

It was nothing; he concentrated again. *Three?*

*Symbol* { *Known name Sam Faxe*
*Power-lust*
*Heavy lethargy*

There were other evoked connotations, but he thought he would know Sam Faxe now.

The other symbols, resolving into names: Ed Vargan, mixed with a curious concept of size-difference; and Bertram Smith, where there was sensed a cruelty akin to that of the blood-drinking carnivores. Though with a difference; Barton had reached into the mind of a weasel when it was feasting, and the sheer flood of ecstacy had almost frightened him. Smith was intelligent, though he, like the others, had that singular quality of —of what?

Darkness. Distortion. Blindness.

*Yes,* Sue thought, *they're blind. Blinded by their paranoia. They can't see this world at all—as it's meant to be.*

And Melissa's visualization of the three: vicious small things running through the dark, teeth bared. She identified them, Barton realized, with—what?—with mice; she had a horror of mice, which to her were far more horrible than insects or snakes. Well, he could understand phobias; he himself was abnormally afraid of fire. Most Baldies were phobic in one degree or another, a penalty paid for increased mental sensitivity.

He thought: *"I" must move fast. If they communicate, they may go into hiding. "I" must kill them at one stroke. Can they read your mind?*

*They do not know Melissa Carr exists.*

*But if one is killed, they will be warned. You must be kept safe. Where are you?*

*Refusal, definite refusal.*

*It would be best to tell me, so—*

*No one can find me as long as I don't think my location. There are no directional finders for telepathy.* The concept she expressed meant more than telepathy; it was the symbol for a whole race and its unity.

*Can you locate Vargan and Smith?*

*Certainly; they spoke freely in their private wave length Vargan is in Rye; Smith is in Huron.*

*How is it you can catch their wave length?*

*Puzzlement. A helpless mental shrug. Born to me?*

Barton thought: *When one of them dies, the others will be warned. Listen carefully. Be sure to relay their plans. They must not escape.*

Melissa thought of the three, small, gray, vicious things scuttling across the floor. Barton grinned tightly.

*See how they run,* he told her. *See where they run to.* His hand touched his dagger. It was not a carving knife, but it would do.

There was not much more. Melissa relayed some of the paranoid thoughts she had caught, and Barton's guess at the menace of the paranoids was confirmed. They were deadly, in the long run, to the whole mutant group. Individual deaths did not matter much, in this era of the duello, but to risk the good will of the entire race was mad-dog tactics. Nor did there seem to be any motive. Sheer malice? It was not logical, and paranoids are always logical, though their structure is founded on a false keystone. The single clue that would give the whole a meaning was, so far, lacking. Nor could Barton find it by turning to his training as a naturalist. Animals do not commit sabotage. Nor do birds foul their own nests.

After Melissa had left them, Sue showed her impatience. "I want to help," she said, orally now. "There must be some way."

"There isn't. You said yourself that this takes a very special skill. You're a biologist. You don't react instantly, the way I do, and if you were along, my attention would be diverted. I've got to concentrate."

"You'll kill them, then?"

"Certainly I'll kill them. Luckily there are only three, according to Melissa. She wasn't lying; I could tell that."

"Oh, she's honest," Sue agreed. "But she's certainly hiding something."

Barton shrugged. "It doesn't matter. What this calls for is prompt action. I can't do much investigating. If I plant any thoughts or questions in non-Baldy minds, the paranoids will start wondering. I've got to eradicate those bichos before the infection spreads. There are plenty of paranoid Baldies who'd joint a movement like that, if they were able to master the secret wave length."

"So what'll I do?"

"It doesn't matter," Barton said, "now. Your job's finished. It's my meat now."

They stood up together. Outside, on the village sidewalk, he left her, with a handclasp that held a deep significance. All around them the casual, evening life of the town was moving, brightly lighted and symbolic of the vast, intricate check-and-balance system that held civilization together. The civilization that tolerated Baldies, and, though perhaps a little grudingly, gave them a chance to work out their own salvation. Both of them were thinking of the same thing: how easily that ordinary throng could be integrated into a blood-hungry mob. It had happened before, when Baldies were still new to the world, and the danger still smoldered.

So Barton went off alone, with the unspoken commission of his whole race commanding him to do what since birth he had been conditioned to do. The race was important; the individuals were not. His helicopter had already been serviced, and he took off for Galileo, on the Atlantic Seaboard, still thinking about what he had to do. He was so abstracted that only automatic radio signals kept him from colliding with other copters. But, finally, the lights of the technicians' town glowed on the horizon.

Like all the communities devoted to technology, Galileo was larger than most villages. Scientists were peaceful folk, and no tech-town had ever been dusted off. Niagara, with its immense source of power, held more people than Galileo, but the latter had a far larger area. Due to the danger of some of the experiments, the town sprawled out for miles, instead of being the tight, compact village that was the general American pattern.

Because of this there was surface-car transport, an unusual thing. Barton guided himself to Denham's house—there were no apartments, of course, in a highly individualistic though interdependent culture—and by good luck found the man at home. Denham was a mild, round-faced Baldy whose wigs had year by year grown grayer until his present one was shot with white. He greeted Barton warmly, but orally, since there were people on the street, and Baldies were tactful about demonstrating their powers.

"Dave. I didn't know you were back. How was Africa?"

"Hot. I haven't had a game of skip-handball for six months. I think I'm getting soft."

"You don't look it," Denham said, with an envious glance. "Come on in. Drink?"

Over a highball they talked nonessentials, except that they didn't—talk. Barton was feeling his way; he didn't want to tell Denham too much, especially since Sam Faxe was here in Galileo, and he went all around the subject without finding out much. It proved more difficult than he had expected. Eventually they ended in the game room, stripped to shorts, facing a vertical wall, scooped into innumerable convolutions, divided into segments that jiggled erratically. There they played skip-handball, and Barton's mind went back to his discussion with Sue. This was one game that telepaths could play. It was easy to tell in advance how hard Denham would swat the ball, but there was no earthly way of judging the angle of reflection. The two bounced around a good deal, getting plenty of exercise, and carrying on a telepathic conversation as they played.

Denham indicated that his favorite game was still crap shooting. Or roulette, by preference. Either of them he could play with his non-Baldy friends, whereas bridge or poker—*uh!* Who'd play poker with a mind reader?

Games that depended on luck or pure muscle were O.K., Barton agreed, but there weren't many of the latter. Wrestling or boxing involved pre-planned thought. But many Olympic trials were possible: shot-putting, high-jumping, racing. In those, as Sue had said, you didn't face your opponent. Any war game, like chess, was impossible.

Well, Denham thought, your vocation's a sort of war game.

Game hunting? Barton let his mind skim over the field, settling on a tiger after a heavy feed, lethargic, and with the deep consciousness of power as in a silently humming dynamo. He tied that in, subtly, with a hunger, and with something, vague and unformed, that was similar to the symbol by which Melissa knew Sam Faxe. His thought then paralleled the identity of Faxe as one musical chord parallels its complement. If Denham knew Faxe at all, he'd probably respond.

And he did. A sense of elation mounted in Barton as he caught the stray fragment, filtering out nonessentials, squeezing it dry of the accumulated Denham-detritus: What remained was a fat, less competent interpreter who served as liaison man sometimes between technicians of different language-groups. Barton hastily changed to another subject so that Denham would not attach any importance to this particular mnemonic ideation.

After that, Barton was anxious to leave. He let Denham win the game, and the novelty of this so delighted the winner that he accepted Barton's excuse of an appointment without obvious skepticism. A man just back in America, after six months of jungle life, would be looking for something more exciting than skip-handball. But it was swell of Barton to drop in—

Barton strolled along the streets, park-bordered, smooth-tiled, letting his receptive mind absorb the thoughts that boiled around him. Now that he knew what to look for, it was not difficult, though it took patience. Patchwork scraps of information came to him very occasionally. And Barton did something to which Baldies very seldom resorted, he put leading questions into the minds of non-Baldies.

This had to be done, for Barton could read only what lay above the threshold of conscious awareness.

And it took real, straining effort to force even a brief stimulating impulse into a nonreceptive mind. The average man is not a telepath, and to communicate mentally with him is like trying to push a needle between closely-fitted tiles. He can, under special circumstances, receive thoughts, but he himself cannot recognize them as impulses from another mind.

Barton was sweating when he had finished. Yet he had managed to pick up considerable information. Moreover, he had done it so subtly that Faxe himself, if he tuned in, would certainly be unsuspicious. A good many people had thought of Faxe tonight, but they were ordinary thoughts—except to Barton, who fitted the jigsaw together. A little here and a little there. And finally he had the picture—an interpreter, altering a shade of meaning as a Tibetan talked to a Bengali, and as both of them turned to a Yankee physiochemist. It was the easier because technicians, immersed in their work, were apt to be insensitive to the finer gradations of human contact, and the result was that here in Galileo a gadget was being built that would eventually cause trouble.

Just how, not even Faxe knew, of course, but his smattering of technical knowledge was sufficient to enable him to smear up the works. A shade of meaning in one man's mind, a slightly different hue in another's, when both should have matched exactly—these, and other things, told Barton that Faxe was a racial traitor.

Moreover, he found out where Faxe lived.

Now, standing outside the man's bungalow, he tried to communicate with Melissa Carr. Almost immediately her thought touched his, in the ordinary radiation level.

*Play it careful,* he ordered. *Use generalities.* And again he was deeply conscious of her femininity, of the softness of curling hair and the smoothness of a curved, youthful cheek. Through the cool, fresh night air breathed something like a wisp of perfume.

*Agreement.*

*Can you locate the others for me quickly? And exactly?*

*Yes. In—*

*Keep tuned in to . . . you know what.*

Again agreement, and that delicately feminine demureness, soft and curiously attractive. She was a little afraid, Barton sensed, and he felt a strong impulse to protect her. A picture of Melissa Carr was beginning to form in his mind, though he knew that it was of necessity prejudiced. Mental concepts and visual ones may differ a great deal. But he thought that Melissa had a small, triangular face, fragile and with delicate features, and that that face was framed with glossy, jet-black curls. He seemed to see her features *from inside,* reversing the usual procedure in which an individual's face helps form the concept of what is behind it.

How does she do it? He wondered at the lucky chance as he crossed the street. Out of all the people in the world, only she can tune in on the special wave length of—

*Barrier!*

He stood now on the porch, facing a closed panel. Through that grained plywood a doubt and a question fingered out, touched his mind, and recoiled. Instantly the man within the house erected a barrier of his own.

Very good. While the mind was thus walled off, Faxe could probably not utilize his super wave length to communicate with the other paranoids. Or . . . or could he?

Barton stepped aside to a circular window. He could see nothing through the one-way glass. With a wary look around, he lifted his foot and kicked the glass into splinters. He stepped through the gap cautiously, into a well-furnished room where a fat man stood against the wall, facing him. The masculinity of the decor told him that Faxe probably lived alone that was natural for the true paranoid type, which required a wife's subjugation. Faxe would not have married a telepath, and no non-Baldy could have lived with him for long.

Twenty years ago Faxe would have been wigless, but this particular type had learned caution since then. The man's wig was of gleaming yellow that went oddly with his heavy, ruddy face.

And suddenly the barrier slipped from Faxe's mind; his brain lay fallow and blank, and Barton felt Melissa's urgent warning thrill through him. *He's warning the others—*

Barton ripped out the dagger from his belt and plunged forward. Instantly Faxe's barrier tightened again, as quickly as his own weapon leaped ready to his fat hand. When dueling with another telepath, it is highly advisable to keep your mind guarded, so your intentions cannot be anticipated. As long as Faxe felt himself seriously menaced, he dared not lower his barrier.

Barton moved in, his eyes calculatingly alert, as he might watch the swaying hood of a cobra. He kept his thumb on the hilt of the dagger and held it at thigh-level. The fat man stepped forward from the wall, balancing on his toes, waiting.

It was, after all, too easy. Telepathy wasn't necessary to forestall the stroke of that clumsy arm. With surgical neatness Barton put his knife in the right place, and made certain that Faxe did not communicate with his colleagues before he died. Then, satisfied, he let himself out of the house by the front door and walked quietly toward the nearest surface-car stop.

That was done. He sent his thought probing in search of Melissa. Somewhere, far away in the hidden dark, she heard and answered.

*Did they receive Faxe's call?*

*No. No, you were too fast, and they didn't expect him to touch them.*

*Good. Vargan and Smith now, then.*

*Tonight?*

*Yes.*

*Good. I don't think you can reach me tomorrow.*

*Why not?*

*Evasion. Vargan—at Rye.*

*Listen. This is important. If there are only three of them, fine. But if they try to communicate with others, be sure to let me know!*

*Yes.* That was all, but the personality of Melissa lingered with Barton as he drove his helicopter northwest through the night. He was not at all affected by the fact that he had committed murder. He did not regard the act as such; there was, undoubtedly, a touch of fanaticism in the way Baldies regarded betrayal from within. Nor was this ordinary betrayal. The means of communication Faxe and the others had discovered was the deadliest menace to the race that had ever existed—more serious than the lynchings a few decades after the Blowup.

Barton had fallen into a mental pattern that always was dominant when he hunted. Now his quarry was human, but far more predatory than any jungle carnivore. Animals killed for food. That was simple Darwinism, and a basic law of nature. But the three paranoids had violated another basic entirely: preservation of the species. They menaced it.

In any new culture there must be conflict, Barton thought, watching dim lights flicker past below, the innumerable torches of the towns that dotted America. And certainly the Baldies had a new culture. It was almost embryonic as yet, a mutation heading for an ultimate end that was so far inconceivable. But it was the first true forward step that mankind had made in a million years. Always before mutations had been very slight, or they had been failures. Now, with hard radiations providing the booster charge, a true mutation had opened a thousand possible doors. And before each door lay blind pitfalls.

For there are dominant and secondary, submerged characteristics. Hairlessness was secondary to Baldies, but there might be other, submerged ones that would emerge in the third or fourth generation. This extraordinary method of subtelepathic communication—was that natural? In Melissa's case it seemed to be so, though Faxe and the rest might have developed the trick themselves. If so, the latent potential lay, perhaps, in every Baldy. And that meant danger indeed.

It was in the true meaning of the term a focus of infection. Healthy cells could be contaminated. The secret might be passed on, and Barton visualized a perfectly hidden, underground network of paranoids, communicating in utter secrecy, planning—anything. It wasn't a pleasant idea.

He wondered how many social-type Baldies could fight such a menace. Not many; they were not qualified for war. War, because of the atomic bombs, was impossible, but this was a new sort of battle. The thing that made the bombs successful through fear-propaganda—the necessity of centralization before any group could be organized—

was inapplicable. There need be no unification, if paranoids could communicate instantly and secretly. Blind luck had stepped in through Melissa, but one could not depend on luck.

Melissa's thought touched him.

*Vargan has signaled Smith; Smith is flying to Rye.*

*What do they know?*

*Vargan told Smith to come immediately. No more.*

*To Rye?*

*It must be a new rendezvous. He gave directions.* She relayed them to Barton.

*O.K. Keep listening.*

Puzzled and a little worried, Barton advanced the copter's speed. He was swinging northward now, toward Lake Erie, by-passing Conestoga. It wouldn't take long to reach Rye. But—had Faxe got through, after all? A telepathic message takes only an instant. Perhaps Vargan had received the fat man's S.O.S. And if Faxe had passed on to his accomplices the knowledge that a Baldy had killed him, and why— Barton shrugged. They would be waiting for him, anyhow. They would know Faxe was dead. If he had no more than called to them in formless appeal and made contact with their minds, they would know. No mistaking that—shapelessness—as life slips inexorably from the body. When they reached out for him now, they would encounter plain nothingness, a curious sort of hiatus in the ether, as if the void had not yet quite closed over the place where a man had been an hour ago. It was unmistakable; no telepath willingly reached out into that quivering blank. But it would impinge upon any receptive mind near it, and soundlessly through the Baldy population of the town the knowledge would spread. *One of Us has died.* Yes, Vargan and Smith knew by now. But they did not yet know, in all probability, how he had died. It might have been accident, it might have been organic. It might have been—murder. They would act upon the assumption that it was. They would be waiting.

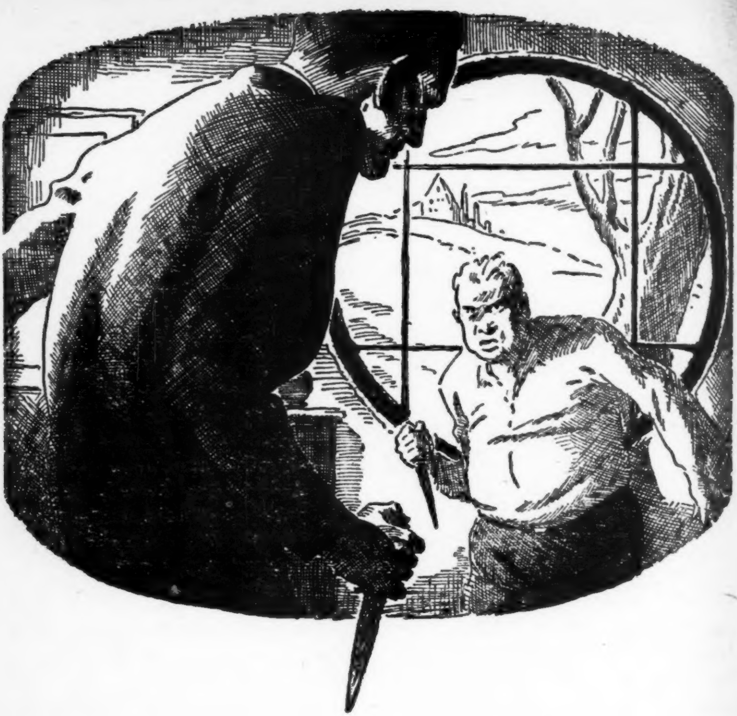
The nearest Rye airfield to his destination was deserted, only the automatic landing lights flicking on as he dropped to earth. Melissa's directions had been clear. He walked half a mile up a road, turned into a narrow lane where moonlight made eerie patterns between flickering leaves, and stopped before an unlighted cottage. As he waited, a thought touched him.

*Come in.* That was Vargan, the size-difference realization a submerged matrix in his mind, a pattern under moving water. *Come in.* But Vargan did not know Barton; he was radiating blind, conscious only that a Baldy was waiting in the lane outside the cottage.

A light came on. The door opened. A small man, scarcely more than five feet tall, with an abnormally large head, stood on the threshold, a black silhouette.

*No traps?*

There was a trap, but it was merely the advantage of numbers. Barton felt that his question was



answered. Vargan fell back as the taller man advanced, and then Barton was in the room, eyeing his opponent.

Vargan had a pinched, worried face, and protuberant eyes. His mouse-brown wig was untidy. He wore eye lenses that reflected the light with a reptilian glitter, and for a moment his gaze took stock of Barton. Then he smiled.

"All right," he said audibly. "Come in and sit down." The thought of contempt was there. Speaking audibly to another Baldy when caution was unnecessary was insultingly patronizing, but Barton was not surprised. *Paranoid,* he thought, and Vargan's mind responded: *Which means super!*

The kitchen valve opened and Bertram Smith came in, a handsome, blond giant, with pale-blue eyes and an expressionless face. Smith carried a tray with bottles, glasses, and ice. He nodded at Barton.

"Vargan wanted to talk to you," he said. "I see no reason, but—"

"What happened to Faxe?" Vargan asked. "Never mind. Have a drink first."

*Poison?*

*Sincere denial. We are stronger than you—*

Barton accepted a glass and sat down in an uncomfortable table chair; he did not want to be too relaxed. His mind was wary, though he knew the uselessness of putting up guards. Vargan hunched his dwarfish form into a relaxer and gulped the liquor. His eyes were steady.

"Now what about Faxe?"

"I killed him," Barton said.

"He was the weakest of us all—"

*All?*

*Three of us—*

*Good. Only two left now.*

Vargan grinned. "You're convinced you can kill us, and we're convinced we can kill you. And since our secret weapons are intangible—self-confidence that can't be measured arbitrarily—we can talk on equal ground. How did you know about our means of communication?"

He could not hide the thought of Melissa. The mind has too much free will at times.

Smith said, "We'll have to kill her too. And that other woman—Sue Connaught, that he was thinking of."

No point in keeping up useless concealment. Barton touched Melissa's mind. *They know. Listen. If they use their secret wave length, tell me instantly.*

"Immediately is pretty fast," Vargan said.

"Thoughts are fast."

"All right. You're underestimating us. Faxe was the newest of our band; he wasn't fast-minded, and he was a push-over for you. Our brains are highly trained and faster than yours." That was a guess; he couldn't *know,* really. Egotism influenced him.

"Do you think," Barton said, "that you can get away with whatever you're trying to do?"

"Yes," Smith said, in his mind a blazing, fanatical conviction that glared like a shining light. "We must."

"All right. What are you trying to do?"

"Preserve the race," Vargan said. "But actively, not passively. We non-Baldies"— He still used the term, though he wore a wig—"aren't willing to bow down before an inferior race, homo sapiens."

"The old quibble. Who says Baldies are homo superior? They simply have an additional sense."

"That's all that keeps man from being a beast. An additional sense. Intelligence. Now there's a new race. It's telepathic. Eventually the next race may have—prescience. I don't know. But I do know that Baldies are the future of the world. God wouldn't have given us our power if He hadn't intended us to use it."

This was merely duelling, but it was something more as well. Barton was intensely curious, for more than one reason.

"You're trying to convince me?"

"Certainly. The more who join us, the faster we'll grow. If you say no, we'll kill you." Only on these intangibles was there the possibility of mental secrecy. Semantics could never alter the divergence of absolute opinions.

"What's your plan?"

"Expansion." Vargan ruffled his untidy brown wig. "And complete secrecy, of course. The sabotage angle—we're just beginning that. Eventually it'll be a big thing. Right now we're concentrating on what we *can* do—"

"Sabotage—and what can you offer in exchange?"

A wave of tremendous self-confidence thrust out at Barton. "Ourselves. We are homo superior. When our race is free, no longer enslaved by mere humans, we can—go to the stars if we want!"

"Enslaved. I don't see it that way."

"You don't. You've been conditioned to accept the pap cowards feed you. It isn't logical. It isn't just or natural. When a new race appears, it's destined to rule."

Barton said, "Remember the lynchings in the old days?"

"Certainly," Vargan nodded. "Humans have one thing we haven't: numerical superiority. And they're organized. The trick is to destroy that organization. How is it maintained?"

"By communication."

"Which goes back to technology. The world's a smoothly running machine, with humanity in the driver's seat. If the machine cracks up—"

Barton laughed. "Are you that good?"

Again the fanatical self-belief flamed in Smith's mind. *A hundred—a thousand mere humans—cannot equal one of us!*

"Well," Vargan said more sanely, "ten men could still lynch a Baldy, provided they weren't disorganized and in social chaos. That, of course, is what we're after. Ultimate social chaos. We're aiming at a bust-up. Then we can take over—after humans go to pot."

"How long will that take? A million years?"

"Perhaps," Vargan said, "if we weren't telepaths, and if we didn't have the secret wave length. That, by the way, takes time to learn, but almost any Baldy can learn it. But we're careful; there'll be no traitors among us. How can there be?"

There couldn't. A thought of hesitancy, of betrayal, could be read. It would be a foolproof organization.

Vargan nodded. "You see? Thousands of Baldies, working secretly for a bust-up, sabotaging, killing where necessary—and always, always avoiding even a hint of suspicion."

"You've sense enough for that, anyway," Barton said. "Even that hint would be fatal."

"I know it." *Anger.* "Humans tolerate us, and we let them. We let them. It's time we took our rightful place."

"We're getting it anyway, slowly. After all, we're intruders in a non-Baldy world. Humans have come to accept us. Eventually we'll get their complete trust and tolerance."

"And—forever—live on tolerance, a helpless minority? Eating the crumbs our lessers are willing to throw us—if we lick their boots?"

"How many Baldies are maladjusted?"

"Plenty."

"All right. They'd be maladjusted in Heaven. The vast majority adjust. I've got the job I want—"

"Have you? You never feel even a little irritated when people know you're a Baldy, and—look at you?"

"Nobody's ever completely happy. Certainly a Baldy world would be rather more pleasant, but that'll come. There are plenty of worlds that will be available eventually. Venus, for one."

"So we sit and wait for interplanetary travel," Vargan mocked. "And what then? There'll be slogans. Earth for humans. No Baldies on Venus. You're a fool. Has it never occurred to you that Baldies *are* the new race?" He looked at Barton. "I see it has. Every one of us has thought the same thing. But we've been conditioned to submerge the thought. Listen. What's the test of a dominant new race? It must be able to dominate. And we can; we've a power that no non-Baldy can ever hope to match. We're like gods pretending to be human because it'll please humans."

"We aren't gods."

"Compared to humans—we are gods. Do you feel pleased at the thought of rearing your children in fear, training them never to offend their inferiors, forcing them to wear—wigs?" Vargan's hand went up to his head, fingers clawed. "This is the stigma of our cowardice. The day when we can walk hairless in a hairless world—then we'll have come into our heritage. All right. Ask yourself—can you say that I'm wrong?"

"No," Barton said. "You may be right. But we're a small minority; the risk's too great. Since you speak of children, you can add a postscript about lynchings. That isn't pretty. Maybe you could get away with this, but you're certain you won't fail. And that's just crazy. You're refusing to admit arguments that might weaken your plan. If even a whisper of this ever got out, every Baldy in the world, wigless or not, would be destroyed. The—humans—could do nothing less, for their own protection. And I couldn't blame them. I admit you're logical—to some extent. And you're dangerous, because you've got the secret telepathic band. But you're paranoid, and that means you're blind. We are getting what we want, on the whole, and because a few paranoid Baldies are malcontent, you set yourselves up as saviors for the whole race. If your idea should spread—"

"That would mean fertile ground, wouldn't it?"

"There are other malajusted Baldies," Barton admitted. "I might have been one myself, maybe, if I hadn't found my pattern for living." He wondered for a moment. His jungle work was fascinating, but what would it be like to return from it to a completely Baldy culture? A world in which he belonged, as no

V 35 4 JUN 45 XU

telepath could belong, really, in this day and age.

Barton turned from the mirage. And simultaneously Melissa's warning thought struck violently into his mind, faster than a shouted word could be; and with equal speed Barton reacted, spinning to his feet and heaving up his chair as a shield. He had not caught Vargan's command; it had been on the secret wave length, but Smith's thrown knife clattered against the plastic chair seat and bounced off against one of the walls.

*Vargan will attack while Smith recovers his weapon.* Melissa was afraid; she shrank from the idea of violence, and the emotions surging unchecked in the room, but her thought struck unwaveringly into Barton's mind. He sprang toward the fallen dagger as Vargan ran at him. Then the two were back on the ordinary telepathic wave length, but with a difference.

One man Barton could have guarded against. Or two men, acting together. But this had been prearranged. Smith was fighting independently, and so was Vargan. Two thought-patterns struck into Barton's mind. Vargan was concentrating on the druello, left, right, feint, and feint again. Barton was skilled enough to be a match for his single opponent, but now Smith had picked up the fallen chair and was coming in with it. His mind was confused, too. *Drive the chair forward low—no, high—no—*

In a feint, there are two mental patterns; dominant and recessive. One has the ring of truth. But Vargan and Smith were attempting to act completely on impulse, purposely confusing their minds in order to confuse Barton. They were succeeding. And more than once they flashed up to the secret band, so Melissa's thought-warning was added to the confusion.

Smith had his dagger back now. A table went crashing over. Barton had taken it fatally for granted that his enemies would act together, and so a sharp point ripped his sleeve and brought blood from a deep cut. In the jungle, where emotion, tropism, instinct, are stronger than intelligence, Barton had been confused in much the same way, but then his own mental power had been the turning factor. Here his opponents were not mindless beasts; they were highly intelligent predators.

The heavy, choking smell of blood was nauseating in the back of his throat. Cat-footed, wary, Barton kept retreating, not daring to be pinned between his enemies. Abruptly Melissa warned: *A rush!* and both Smith and Vargan came at him, blades gleaming where they were not crimson.

*Heart—clavicle—up-stroke—feint—*

Confused and chaotic, the furious thoughts caught him in a whirlwind. He spun to face Smith, knew his mistake, and ducked not quite in time. Vargan's dagger ripped his left biceps. And with that blow Barton knew that he had failed; he was no match for the two paranoids.

He ran for the chair, thinking of

it as a shield, but at the last moment, before his mind could be read, he sent it hurtling toward the fluorescent. With a tinkle of glass the tube broke. In the dark, Barton dived for the door. They knew what he intended and anticipated him; they knew he would depend on impetus to carry him through. But they could not stop him. He got a knee hard on the point of his jaw, and, dazed, slashed right and left half-mindlessly. Perhaps that saved him.

He broke through, thinking of his copter. Escape and help now. He felt Vargan's thought: *the short cut.*

*Thanks,* he sent back mockingly.

The short cut saved time, and he was long-legged. As yet there were no plans. He did not try to think of any. Escape and help; details later. The paranoids came after him for a short distance.

*No use; he'll make it. Get my copter.*

*Right. We'll trail him.*

They went elsewhere. Barton felt their brief questions touching his mind, though, and concentrated on running. He could not easily escape the paranoids, now that they knew him. Nor would they again lose touch with his mind.

The landing field was still vacant, except for his own helicopter. He got in and sent the plane southwest, a vague thought of Sue Connaught guiding him. Melissa could not help; he didn't even knew where she was. But Sue was in Conestoga, and between the two of them—

Also, she had to be warned. He reached for her mind across the dark miles.

*What's wrong?*

He told her. *Get a weapon. Protect yourself. I'm coming in.*

*Plan—*

*Don't try to think of any. They'll know.*

And Melissa, frightened, the psychic scent of fear strong in her thought. *How can I help?*

*Don't reveal where you are. If we fail, tell the truth to other Baldies. These paranoids must be destroyed.*

Sue: *Can I intercept their copter?*

*No. Don't try. They're following, but not overtaking.*

A grotesque silver shape in the moonlight, the pursuing helicopter raced in Barton's track. He improvised a bandage for his wounded arm. After consideration, he wound many heavy strips of cloth around his left forearm. A shield, if—

He could not plan his tactics; that would be fatal. Telepaths could not play chess or any war game, because they would automatically betray themselves. They could play skip-handball, but that had a viariable factor, the movable backboard. If a random factor could be introduced—

Vargan's eager question touched him. *Such as?*

Barton shivered. He must, somehow, manage to act on impulse, without any preconceived plan. Otherwise he would inevitably fail.

He called Melissa. *Are they using the secret band?*

V35 4 JUN 45 XUM

*No.*

*If we fail, it's your job. Vargan and Smith must die. This is more important than merely killing three men. If other paranoids get the idea, if they, too, learn the secret wave length, this suicidal movement will grow. And non-Baldies will inevitably find out about it, sometime. That will mean the annihilation of every Baldy on earth. For the humans can't afford to take chances. If we fail to check the paranoids—it means the end of our whole race.*

The lights of Conestoga glowed. No plan yet. Don't try to think of one.

*There must be a way,* Vargan urged. *What?*

Sue broke in. *I'm coming up in my coper.*

The zoo was below, dark now, except for the silvering moonlight. Another plane, gleaming bright, lifted into view to intercept them. Sue thought: *I'll ram them—*

*Fool,* Barton thought. *Don't warn them!* But it was a new idea, thrust suddenly into his own mind, and he reacted instantly. Mechanical controls are not instantaneous. By Vargan's sudden decision to drop to a lower level, where a collision with Sue's plane would not be fatal, he had put himself too close to Barton. And Barton's hands stabbed at the controls.

Vargan read the thought as fast as it was conceived. But his copter could not respond with the speed of thought. The flying vanes meshed and crackled; with a scream of tortured alloys the two ships sideslipped. The automatic safety devices took over—the ones that were not smashed—but only low altitude saved Barton and his enemies from death.

They crashed down in the central zoo area, near the shark's tank. Vargan read the thought in Barton's mind and telepathed to Smith urgently: *Kill him! Fast!*

Barton scrambled free of the wreckage. He sensed Sue hovering above, ready to land, and told her: *Turn your lights on—the spots. Top illumination. Wake the animals.*

He dodged away from the two figures closing in on him. He ripped the bandage from his upper arm and let the smell of fresh blood scent the air. And—he yelled.

From Sue's copter beams of light glared down, flaring into cages, dazzling bright.

*Kill him,* Vargan thought. *Quick!*

The asthmatic cough of a lion sounded. Barton dodged by the tank and tossed his blood-stained bandage over the railing. There was a flurry of water slashed into foam as the great shark woke to life.

And, from cage and tank, from the beasts waked into a turmoil of light and sound and blood-smell—came the variable.

Sue had got her siren working, and its shattering blast bellowed through the night. Patterns of light blazed erratically here and there. Barton saw Smith pause and shake his head. Vargan, teeth bared, ran forward, but he, too, was shaken.

Their thoughts were—confused now. For this wasn't chess any more. It was skip-handball, with a variable gone wild.

For beasts are not intelligent, in the true meaning of the word. They have instinct, tropism, a terrible passion that is primevally powerful. Even nontelepaths find the hunger-roar of a lion disturbing. To a Baldy—

What blasted up from the great tank was worst of all. It shook even Barton. The paranoid minds could not communicate, could scarcely think, against that beast-torrent of mental hunger and fury that poured through the night.

Nor could they—now—read Barton's mind. They were like men caught in the blazing rays of a searchlight. Telepathically, they were blinded.

But Barton, a trained naturalist, had better control. It wasn't pleasant even for him. Yet his familiarity with tiger and shark, wolf and lion, gave him some sort of protection against the predatory thoughts. He sensed Melissa's terrified, panic-stricken withdrawal, and knew that Sue was biting her lips and trying desperately to keep control. But for half a mile around that mental Niagara, telepathic communication was impossible except for a very special type of mind.

Barton had that type of mind.

Because he could read the thoughts of Vargan and Smith, and because they could not read his, the duel ended in his favor. He had to kill the pair before help came. The paranoids' secret had to be hushed up forever.

And, with the sharp blade of his dagger, he finished his job. Smith died silently. From Vargan's waning mind came a desperate, passionate cry: *You fool! To destroy your own race—*

Then silence, as the copter's siren faded, and the spotlights blinked out. Only beast-cries, and the turmoil of water in the enormous tank.

"They'll hush it up," Barton said. "I've done that much already, since yesterday. Luckily we've got a few Baldies high up in the judicial. I didn't tell even them too much, but —they have the general idea. It'll be passed over as a personal quarrel. The duello's legal, anyway."

Afternoon sunlight glittered on the Ohio. The little sailboat heeled under a gust of wind, and Sue moved the tiller, in response to Barton's thought. The soft susurrus of water whispered under the keel.

"But I can't reach Melissa," he added.

Sue didn't answer. He looked at her.

"You've been communicating with her today. Why can't I?"

"She's . . . it's difficult," Sue said. "Why not forget it?"

"No."

"Later on—in a week or so—"

He remembered Melissa's demure, feminine gentleness, and her frightened withdrawal last night. "I want to be sure she's all right."

"No—" Sue said, and tried to conceal a thought. She almost succeeded, but not quite. Something, a key, a pattern, showed in her mind.

"An altered matrix?" Barton looked at her. "How could she—"

V35 4 JUN 45 XU

"Dave," Sue said, "please don't touch her now. She wouldn't want it—"

But with the key at hand, and the locked door ready to open, Barton automatically sent his thought out, probing, questioning. And, very far away, something stirred in response.

Melissa?

Silently Sue watched the tiller. After a long time, Barton shivered. His face was strained; there were new lines around his mouth.

"Did you know?" he asked.

"Not till today," Sue said. For some reason neither of them wanted to use telepathy at the moment.

"The . . . the business at the zoo must have done it."

"It isn't permanent. It must be a cycle."

"So that's why she was able to tune in on the secret wave length," Barton said harshly. "This mutation—it runs very close to the line sometimes." He looked at his shaking hand. "Her mind—*that* was her mind!"

"It runs in cycles," Sue said quietly. "What I wonder now is—will she talk? Can her thoughts be picked up by—"

"There's no danger," Barton said. "I stayed in long enough to make certain of that. Otherwise I—wouldn't have stayed in at all. In this state, she has no memory of what happens when she's—rational."

Sue moved her lips. "She doesn't know she's insane. She just senses something wrong. That's why she wouldn't tell us where she was. Oh—Dave! So many of us, so many mutants, gone off the track somewhere! It's a horrible price."

He nodded slowly, his eyes grave. There was always a price, somehow. And yet, if paying it brought security to the mutants—

But it hadn't, really. For Barton saw clearly now that an era had finally ended in the life of the Baldy race. Till yesterday the path had seemed clear before them. But yesterday an evil had been unveiled in the very heart of their own race, and it was an evil which would menace the peace of the world until one race or the other was wiped wholly off the face of the earth. For what a few telepaths had stumbled upon already, others would discover in the future. Had, perhaps, already discovered. And must not be allowed to retain.

*Thou, O son of man, I have set a watchman unto the house of Israel.*

We must be on guard now, he thought. Always on guard. And he knew suddenly that his maturation had taken one long forward step in the past few hours. First he had been aimless, open to any possibility that knocked loudest at the doors of his mind. Then he had found the job he was suited for, and in its comfortable adjustment thought himself adult at last. Until yesterday—until today.

It was not enough to hunt animals. His work was laid out before him on a scale so vast he could not see it clearly yet, but its outlines were very clear. He could not do the job alone. It would take many others. It would take constant watchfulness from this hour on, over the whole world. Today, perhaps for the first time in nearly two thousand years, the Crusaders were born again.

Strange, he thought, that it had taken a madwoman to give them their first warning. So that not even the mad were useless in the progress of the race. Strange that the threefold divisions of the mutants had so closely interwoven in the conflict just passed. Mad, sane, sane-paranoid. And typical that even in deadly combat the three lines wove together interdependently.

He looked at Sue. Their minds reached out and touched, and in the deep, warm assurance of meeting was no room for doubt or regret. This, at least, was their heritage. And it was worth any price the future demanded of them—this knowledge of confident unity, through any darkness, across any miles. The fire on the hearth would not burn out until the last Baldy died.

END.

---

## THE ANALYTICAL LABORATORY

Again we have a close race, with Leiber, Smith, and Asimov only 0.6 points apart. The results:

### MARCH, 1945 ASTOUNDING

| Place | Story | Author | Points |
|---|---|---|---|
| 1. | Destiny Times Three (Pt. 1) | Fritz Leiber | 2.10 |
| 2. | Special Delivery | George O. Smith | 2.30 |
| 3. | Blind Alley | Isaac Asimov | 2.70 |
| 4. | Altar Ego | A. Bertram Chandler | 3.60 |
| 5. | When the Rockets Come | Robert Abernathy | 3.70 |

V35 4 JUN 45 XUM

# Not Friction

## by FRED NASH

We have been told so often, and so authoritatively, that meteorites are consumed by air friction in falling through the atmosphere, that we accept, without thinking, the truth of this statement. Since any heat generated in the gas by friction would be external to a slowly changing boundary layer, it would be carried away without materially affecting the meteorite.

The true explanation will be found in a consideration of the dynamic theory of gases with respect to the velocity of fall of the meteorite. The theory of gases requires that the temperature of the gas be proportional to the square of the molecular velocity in the gas as long as it follows the laws of Boyle and Charles. That is, as long as it remains a gas of unchanged chemical and physical properties.

To escape from in front of the meteorite, the gas molecules must have a velocity at least approximately that of the meteorite. This velocity is achieved by compression, but with the velocity there is always heat. Since the velocity of the meteorite and consequently the molecular velocity of the gas is enormous with respect to the ordinary molecular velocity, the gas will be hot. Just how hot can be calculated from the temperature-velocity relation.

A meteorite cannot reach Earth at less than the Earth's escape velocity of eleven thousand meters per second. A more probable velocity is the solar system escape velocity of eighty thousand meters per second. If twenty thousand meters is assumed as a probable minimum velocity, the temperature works out to be 540,000° K.

This fantastic temperature is, of course, not reached as changes in the gas at far lower temperatures cause deviations from the relatively simple law cited. But it is enough to show that it is not friction but compression that causes the heat. Compression enough to give the molecules velocity to get out of the way of the meteorite; get out of the way or get blasted into radiation.

Calculations on an energy basis indicate that an average size slow meteorite radiates at about the same rate as the sun. On this basis the temperature is about 6,000° K which is still hot; and probably very close to the correct value.

The temperature of the gas piled up in front of a large, fast meteorite would be much hotter.

THE END.

ture-

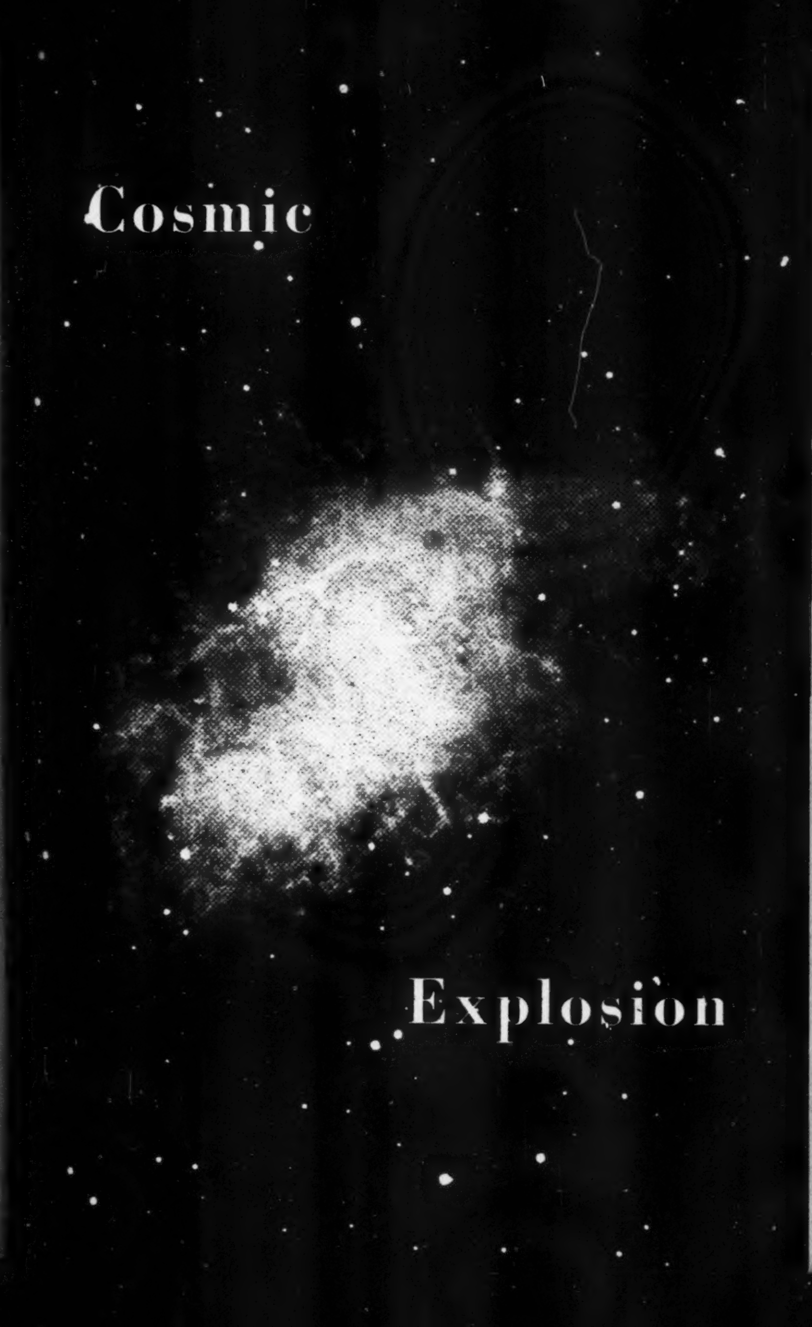
arth
cape
eters
bable
scape
eters
sand
bable
ature

e is,
anges
tures
rela-
it is
fric-
es the
give
ut of
t out
into

basis
slow
the
basis
0° K
bably
ue.
piled
eteor-

TION

# Cosmic Explosion



# Prediction—Past Tense

## by R. S. RICHARDSON

***While** not strictly pre-diction, the astronomer's job in trying to determine what happened one thousand years from now is just about equally hard whether it's plus one thousand or minus one thousand. And when the work is being done with an object so unique as the Crab Nebula, it approaches the impossible.*

Photographs from Mount Wilson Observatory.

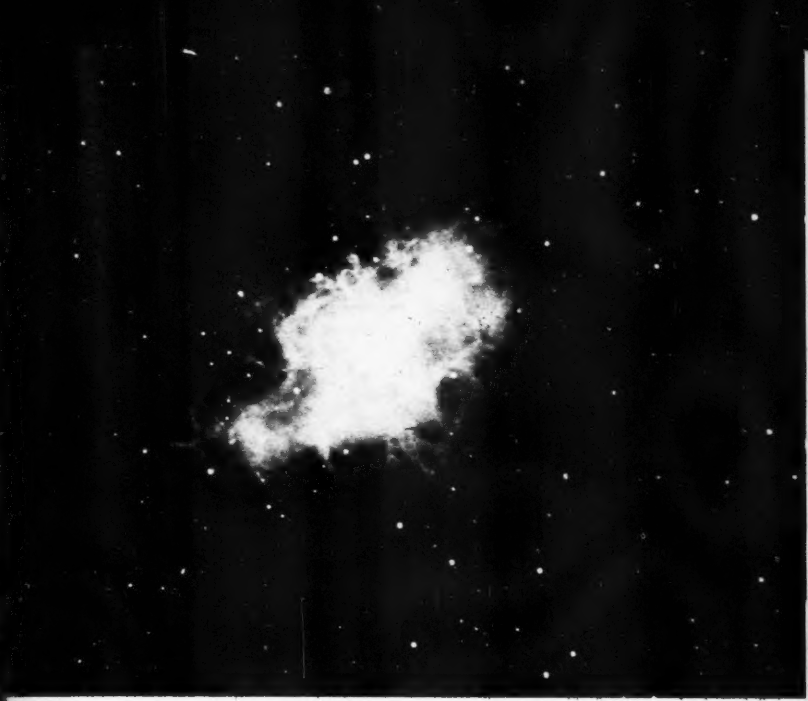
If there is one thing astronomers can do really well, it is to predict.

Undoubtedly one of the main reasons why astronomers have always had a certain fascination for the public is because of this seemingly uncanny ability to foretell the future. Of course, anybody can make predictions. Lots of people do. The trouble is, their efforts are so seldom more successful than would be expected from the laws of chance.

But when you read in the American Ephemeris that there will be a total eclipse of the sun visible from Rybinsk, U.S.S.R., on July 9, 1945, beginning at 14 hours, 19 minutes, 56.8 seconds, Greenwich Civil Time, then you know that the Rybinskians can get a piece of smoked glass ready for use on that date with absolute assurance the event will come off as scheduled. To the uninitiated it looks like witchcraft. And many an astronomer has been burnt at the stake because the authorities were convinced that it *was* witchcraft.

Did it ever occur to you that the ability to predict events in the past may be just as important and even more difficult than in the future? You may object, "Why, that is easy. An event in the past has already happened. We know what lies in the time-stream behind us."

But do we? All we really know about the past is contained in the few records that remain with us in the present. We can be sure

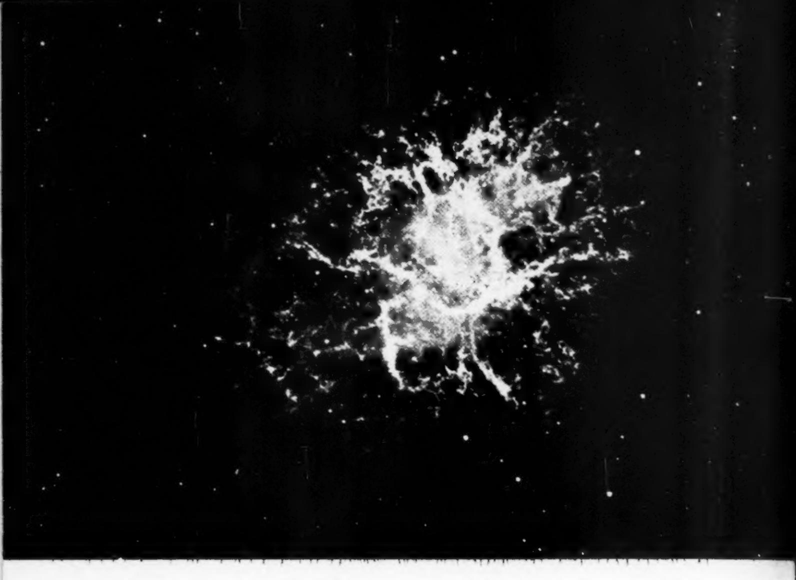


*On page 99 is a photograph of the Crab Nebula taken on panchromatic film—the blue, green and yellowish light. Plate above was exposed to the orange-red portion of the spectrum—filaments clearer, center dimmer.*

the future will eventually arrive. But the past is forever receding into the distance, growing more remote and hazy with the passage of every second. To predict an event that lies buried back a thousand years and then be able to prove your prediction is correct, requires some really expert prognosticating.

Trying to predict the origin of things is naturally nothing new for astronomers. But usually they aim to go back far enough, say a couple of billion years, so there is no danger of anyone checking up on them too closely. Recently, however, astronomers have done some heavy predicting that goes back in time only to the vicinity of the Battle of Hastings, an era which is growing a trifle dim but is still sufficiently close to be in fairly good focus.

If it were predicting the positions of the planets or something of that sort, there would be nothing to it. We can run the solar system backward as easily as we can run it forward. Foretelling the past or future on the basis of the law of gravitation is hardly more in the



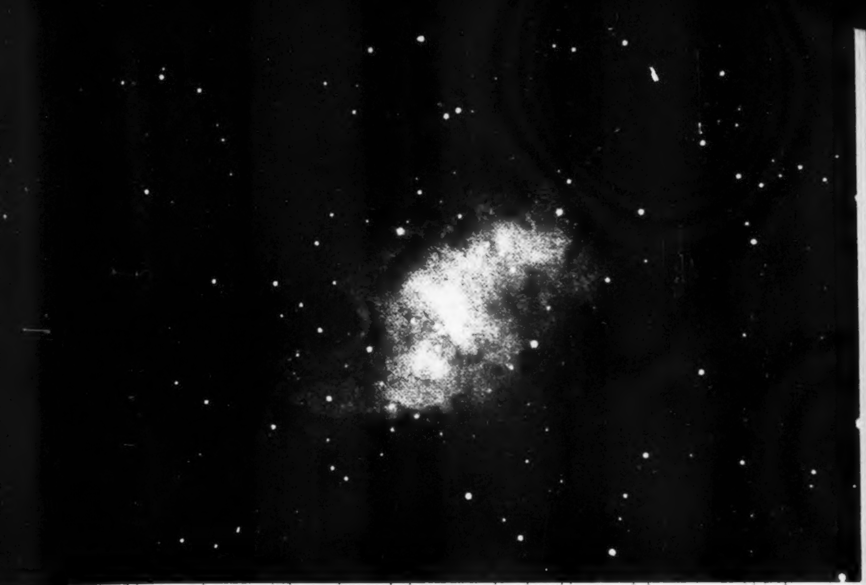
*Still further down. This plate, exposed in the extreme red between 6300 and 6700 angstroms, shows great detail in the outer portion.*

nature of a prediction than winding or unwinding a reel of motion picture film.

But in this case, astronomers were trying to make a prediction which did not admit of precise calculation. They were somewhat in the position of a meteorologist who tries to predict the temperature for Medicine Hat on January 1st with nothing to guide him but the weather maps for January 28th and 30th.

The astronomers' problem was this. They had found what was believed to be the remnants of an exploding star. They had measured the rate at which it was still exploding. From the measured rate of expansion they could predict when the explosion occurred. But could they prove it? That was the question they were asking twenty years ago. Today they feel closer to the answer than ever before. Let us see the reason why.

The constellation of Taurus the Bull is one of those regions that contains a treasury of celestial wonders, with the Pleiades, Hyades, Aldebaran, et cetera. Taurus also contains one of the weirdest objects in the whole sky—a thing called the Crab Nebula. The name is misleading, for it neither resembles a crab nor is allied with the typical gaseous nebulae. But the designation is now much too firmly entrenched in the literature ever to



*The greatly increased contrast and detail shown in the far red is lost again in this infrared exposure, in the region 7200 to 8000 angstroms.*

be dislodged, and will probably be perpetuated on down through the centuries along with the "seas" on the moon and the "canals" of Mars.

Who discovered the Crab Nebula will never be known. Like the planet Neptune, it seems to have been discovered several times before becoming officially fixed in the sky. As nearly as we can tell, it was first sighted in 1731 by an amateur, an English physician named John Bevis, whose hobby was astronomy.

In 1758 it was discovered again by Messier while at his usual occupation of looking for comets. Messier, it will be recalled, was the indefatigable comet hunter whom Louis XV dubbed the "ferret of the skies." One of the most annoying features about comet hunting is making sure you have really found a comet and not a nebula or star cluster. For his own convenience, Messier made a catalogue of a hundred of these fuzzy objects which closely resemble the average telescopic comet. Messier took vast pride in the fact that he discovered twenty comets with a two-inch telescope. But he would have been forgotten long ago if it were not for his catalogue. For today these hundred objects are still designated by the number Messier gave them: for example, the star cluster in Hercules is Messier 13, the great nebula in Andromeda is

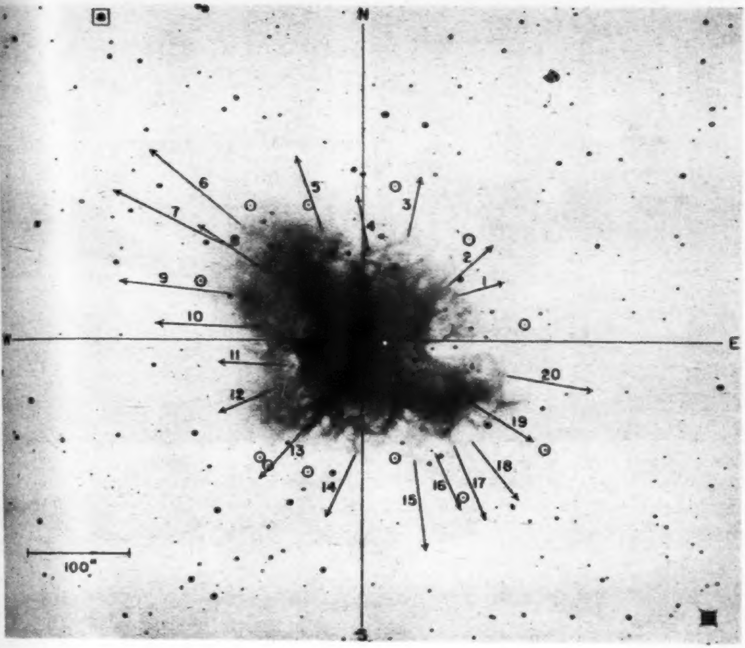
Messier 31. And the Crab Nebula had the honor of being Messier 1—the first object in the first important astronomical catalogue of nebulae.

Many a young astronomer has become excited over a cometary looking body which he picks up in the course of his regular work. His first impulse is to telegraph the news to the Harvard College Observatory, which acts as the clearing house for astronomical discoveries. Then he hesitates. Perhaps he had better check to see if a nebula or cluster is in that region. And sure enough—to his chagrin he finds it is only Messier 51 to which a footnote is appended, "often mistaken for comet." Sadder and wiser, he returns to his telescope with the realization that his name is now added to the long list of suckers before him who thought they had found something.

Even after Messier's catalogue was published, astronomers kept on discovering the Crab Nebula. The era of discovery finally ended in 1844 when Lord Rosse made a drawing of the nebula as seen through the six-foot reflector erected upon his estate at Parsontown, Ireland. This telescope was the giant of its day and can still probably claim the distinction of being the unwieldiest ever pointed at the sky, which is saying a good deal. The tube swung up and down between two parallel walls of masonry from which it was suspended by chains. This limited the time you could observe a star to the few minutes it was on your meridian. If you failed to catch it when directly north or south, you had to wait until the next night. Apparently there was no clock drive, the telescope being kept on the star by the old tried and true system of moving it by hand.

I have just resurrected an old engraving of Lord Rosse's original drawing of the Crab Nebula. The representation is startling, to say the least. With a full appreciation of the difficulties under which observations were made with such an instrument, one cannot help but suspicion that if his lordship really thought he saw in the sky what he drew on paper, he must have been fortified with some of the Irish whiskey for which that section of the Isle is famous. The picture more nearly resembles the body louse, *pediculis corporis*, under a magnification of 1000X than it does a crab. But it looked like a crab to Lord Rosse and as the Crab Nebula it has been known for a century.

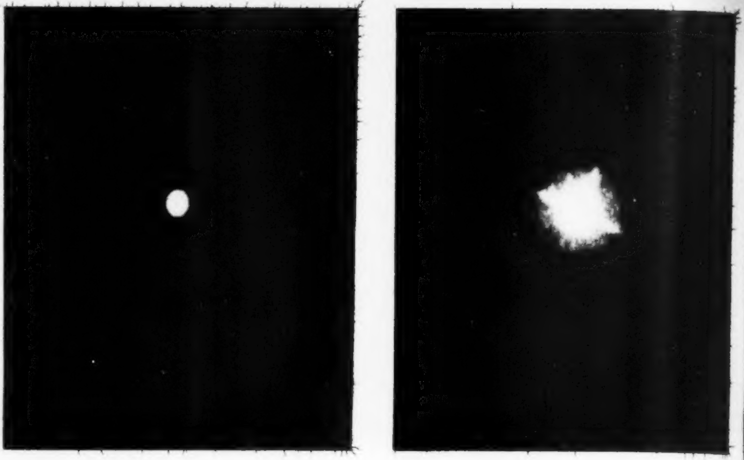
Not until the Crab Nebula came under the searching scrutiny of the photographic plate did astronomers begin to notice anything remarkable about it. But as they became more familiar with the nebulae in general, it began to dawn that here was an object wholly unique. As Lampland of the Lowell Observatory noted in substance in 1921, "In form and in the character of its detail the Crab Nebula may be said to stand in a class by itself. At first sight, it resembles an oval



*The vector arrows represent five hundred years' motion of parts of the Crab Nebula. Projected backward they indicate origin at the white dot.*

nebulous mass like a piece of coarsely woven fabric shot through with loose, threadlike filaments, which give it a peculiarly frayed or unraveled aspect along its border. But on closer examination the nebula is seen to be composed of two parts: an inner brighter mass in which the structure is very intricate, surrounded by an outer system of fine tentaclelike filaments."

As plates began to accumulate, it was only natural for astronomers to compare those taken several years apart in the hope of finding changes in this queer object. The easiest way to do this is by "blinking" them; that is, by putting them on a machine called a blink comparator whereby two plates can be viewed alternately through the same eyepiece. Two photographs of the same object on the same scale are adjusted in the machine so that the fixed stars common to both appear superimposed in the eyepiece. By rapidly switching from a view of one plate to the other, any moving point will seem to jump among the stars which remain stationary.

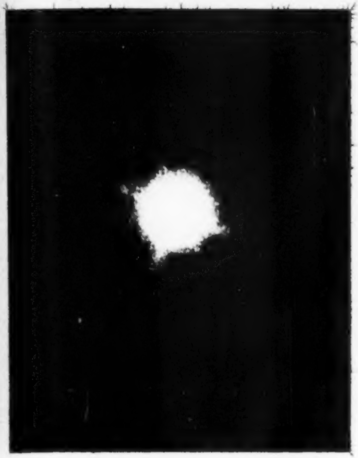


*Another type of nova—a mere ordinary nova!—shows an expanding nebulous ring in a few years. These three plates show Nova Aquilae.*

Thus by means of the blink comparator a faint asteroid can be made to reveal itself by the way it jumps among the fixed star images on two photographs taken a short time apart. It was by "blinking" the Crab Nebula that Lampland first detected motion among the tangled outer network of filaments. He announced the motion without attempting to measure it exactly.

To measure an effect of this kind is a much more difficult job than might be supposed from the plates themselves. Unlike measurements on star images, there are no sharp points on which to set the cross hairs of the eyepiece. (Photographs of the stars intended for measurement are made with the shortest exposures possible so that the images are tiny points instead of the blobs they appear on plates taken to exhibit some special object. The best you can do is to select the sharpest, most conspicuous nebular knots and condensations and then measure them as honestly as you can.

The first exact measurements on the Crab Nebula were made by Duncan in 1921 on two plates taken at Mount Wilson eleven and one half years apart. He selected twelve condensations around the edge of the nebula and measured their positions with respect to the nearby fixed stars. The results for the different points varied slightly as might be anticipated, but, on the whole, the agreement among them was very good. They showed definitely that the mass is not a



*Extreme left, July, 1922. Center, Sept. 1926. Above, August, 1931*

static thing. Instead the Crab Nebula is *expanding*.

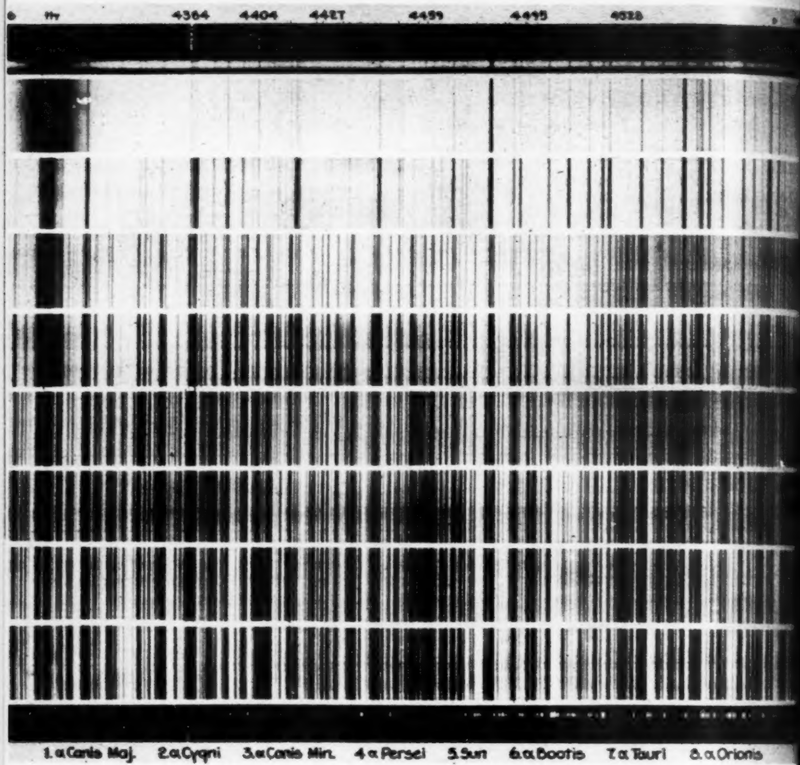
Now expanding nebulosity was not altogether unknown at that time. A cloud had already been observed surrounding Nova Persei (1901) and Nova Aquilae (1918). The rate of expansion around these novae had been measured so accurately that if the dates of the outbursts were unknown they could have been set approximately by calculating backward to the time when all the outward moving points intersected.

What was more natural than to assume that the Crab Nebula was a sort of fossilized explosion? The remnants of a nova that had exploded centuries ago, and because there is nothing to stop particles in space, is *still* exploding. Just as in the case of Nova Persei and Nova Aquilae, it should be possible to calculate back to the time when all the outward moving velocity arrows would converge to a point. The point of convergence should mark the position of the exploding star. And the distance through which they were traced backward should give the time since the explosion occurred.

When these operations were carried out, the arrows were found to converge near a point occupied by a faint double star at the center of the nebula. The time of the explosion was much more uncertain but was tentatively set at somewhere around 1100 A. D.

The next step was to see if anyone had chanced to observe a nova about eight hundred years ago in the direction of the Crab Nebula. It so happened that the Swedish astronomer, Lundmark, had just published a list of suspected novae obtained from translations of ancient documents. There was a record of one nova observed by a Chinese in 1054 A. D. that looked pretty hopeful.

The Chinese have contributed relatively little to modern astronomy, but they were certainly on the job in the past. Whether it was an ancient eclipse, a naked-eye sunspot, or a bright comet, the Chinese had it. Just dig around long enough among their old manuscripts and there it is. The world is indebted to the Chinese for two great contributions to civilization—gunpowder and toilet paper. But


Hγ
4384
4404
4427
4459
4495
4528
1. α Canis Maj.
2. α Cygni
3. α Canis Min.
4. α Persei
5. Sun
6. α Bootis
7. α Tauri
8. α Orionis

*The effect of increasing stellar temperature on the spectrum. At the top are extremely hot stars; at bottom, cool ones. 1. Sirius; 2. Deneb; 3. Procyon; 4. Marsak; 5. The Sun; 6. Arcturus; 7. Aldebaran; 8. Betelgeuse.*

astronomers owe them a special debt of gratitude for always being around when anything exciting was going on in the heavens.

Unfortunately, the information which Lundmark had uncovered was not sufficient in itself to identify the nova beyond a reasonable doubt. Like most ancient documents, this one was couched in vague and unfamiliar terms. In addition, there was an uncertainty of about fifty years between the observed and calculated times. Corroboratory evidence from an independent source was required before the identification could be considered established.

If astronomers seem unduly conservative in thus withholding judgment, it is because they have had plenty of opportunity to find how badly people can be in error when it comes to reporting celestial phenomena. Almost every week a large observatory will receive a letter or telephone call about a strange light or moving star in the heavens. Often such reports can be attributed to a meteor or an airplane. But in many instances there seems no escape from the conclusion that the individual dreamed he saw something. I once became involved in a long telephonic conversation with a man who was wildly excited because he had been seeing the moon all day. He was sure the moon had either gotten clear out of its orbit or strayed badly from the beaten path. And no amount of reasoning would convince him otherwise.

Today after twenty years new records of old novae have been found and better measures on the Crab nebula are available. There can now be no further doubt but that an exceptionally brilliant nova appeared in the constellation of Taurus in June or July of 1054 A. D. The latest measures on the Crab Nebula using an interval of twenty-nine years have put the time of explosion at about 1172 A. D. Although this makes the discrepancy even greater than originally, the measures are so uncertain that the difference of one hundred eighteen years is not regarded as excessive. Besides, we have no guarantee that the rate of expansion would remain absolutely constant for eight hundred years.

It is interesting to see how much information can be extracted from the Chinese observations. One observation in particular relating to the disappearance of the "guest star," as the Chinese called it, is of the utmost significance.

"Originally this star had become visible in the fifth moon of the first year of the period Chih-ho—from June 9th to July 8, 1054—in the eastern heavens in the T'ien-kuan—near the star Zeta Tauri; *it was visible by day, like Venus;* pointed rays shot out from it on all sides; the color was a reddish-white. *Altogether it was visible for twenty-three days.*"

Obviously this quotation was made by a Chinaman who was a good observer. He gives us a great deal of valuable information. The two italicized statements are of vital importance, for they enable us to determine the apparent brightness of the nova with high accuracy.

The fact that it was as bright as Venus and could be seen in broad daylight tells us at once that its magnitude was at least -4. (The faintest naked-eye star has an apparent magnitude of 6.) The experts, however, are inclined to put more faith in the statement that it was visible in daylight for twenty-three days. From comparison with the light curves of novae carefully studied in modern times they feel that one which remained visible to the naked eye for so long probably had a magnitude of at least -5.

To be able to obtain a reliable

value for the apparent magnitude of a nova that flared up eight hundred years ago is really getting somewhere. For by combining this figure with the distance of the Crab Nebula the astounding fact emerges that not only was the guest star of 1054 A. D. a nova but a supernova, and what is more, just about the brightest supernova on record.

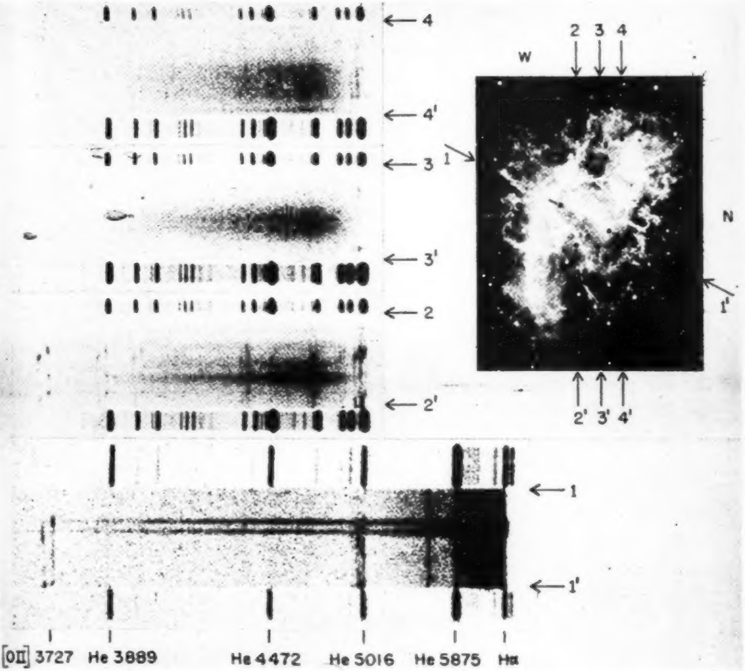
In order to compare the brightness of supernovae—or any stars for that matter—we must first put them at the standard distance astronomers have adopted for this purpose of ten parsecs or thirty-three light-years. The magnitude of a star at ten parsecs is called its absolute magnitude. Until we know the absolute magnitude we know very little about the true luminosity of a star. The sun looks so bright because it is so near. If the sun were moved off to the standard distance of ten parsecs, its magnitude would drop from *-26.7* down to 5, showing that Sol is just an ordinary dwarf of moderate brightness.

Knowing the apparent magnitude of the nova of 1054 A. D. we can compute its absolute magnitude as soon as we know the distance. Or what now amounts to the same thing, the distance to the Crab Nebula. And as I had occasion to remark in a previous article, astronomers are never at a loss when the distance of a star is concerned.

In this case, it is really very simple. Duncan's measures give us the rate of expansion of the nebula in *angular* units; how long it takes the nebula to expand one second of arc, for example. If we knew how many *miles* corresponded to an expansion of one second of arc, the distance could be found on a slide rule immediately. But first we must know the rate of expansion in miles.

This seemingly hopeless quantity is readily obtained with that handy instrument, the spectroscope. Doppler's principle tells us that when a source of light is approaching the observer, the rays it emits—spectrum lines—will be shifted to the violet side of their normal position; if receding, the shift is toward the red. Furthermore, the greater the speed of approach or recession the greater is the shift to the violet or red.

If there is any further lingering doubt about whether the Crab Nebula is expanding or not, it would be quickly removed by one look at a photograph of its spectrum. For the lines instead of being straight are split into two parts like a bow. At the rim of the nebula where the particles are at rest in our line of sight there is no shift toward the red or violet. But as we go toward the center of the nebula we begin to get light from both sides of it. From the nearer or approaching side we get light that is shifted toward the violet. From the farther or receding side we get light that is displaced toward the red. As a consequence, a spectrum line such as the powerful red ray emitted by hydrogen called H Alpha is bowed



*Getting the spectrum of a nebula, or of a nebula-wrapped star, is extremely difficult. The cometlike, almost featureless blurs are the nebular spectra; the lines at top and bottom of each are for comparison. The figures indicate the direction of the spectroscope slit in each exposure.*

or lens shaped. The lines come together at the rim of the nebula and are spread farthest apart at the center.

By measuring the maximum separation between the red and violet components of the bow-shaped line we can get the speed in *miles* at which the nebula is expanding. Measurements on the various spectrum lines gives a mean velocity of expansion of two million three hundred thousand miles per hour*. Using the best value for the rate of angular expansion we get a distance of four thousand one hundred light-years. Knowing the distance, we can obtain the dimensions of the nebula. It is a football shaped mass about six light-years long and three point five light-years wide.

---

* It is interesting to note that the spectroscope alone does not tell us whether the nebula is expanding or contracting. But from Duncan's work we know it must be a motion of expansion.

At a distance of four thousand one hundred light-years and an apparent magnitude of -5, the absolute magnitude of the supernova at maximum was -16.5, which is very nearly the highest ever measured for any supernova either inside our galaxy or without. If the supernova of 1054 A. D. had been as near as Alpha Centauri, it would have lit up the night sky with a brightness equal to that of thirty-seven hundred full moons.

The question that arises to bother us now is, what has kept the Crab Nebula shining these eight hundred years? A flimsy cloud of gas thousands of times more rarefied than the air we breathe cannot be "just on fire" out there in the cold of space, as a student of mine once maintained. Somewhere on the premises there must be a powerful source of energy supply.

We know that the other nebulae in our galaxy are illuminated by the stars imbedded within them. If there is no star, there is no nebula in sight. Many dark nebulae are revealed only because there happens to be a bright background of stars behind them.

In the case of some nebulae, such as those surrounding the Pleiades, the gas is illuminated simply by reflection, just as a street light illuminates the fog around it. The nebula then is the same color as the star that makes it visible. But if the star is hotter than 20,000 K it will set the nebula to shining on its own account. In other words, instead of the star doing all the work as in the pure reflection nebulae, the star feeds energy into the gas, "excites" it—and forces the nebula to self luminosity. This is what is happening in the greenish colored nebulae such as the one in the sword of Orion.

The Crab Nebula shines in a way that is different from either of these. The inner part, which is responsible for eighty percent of the total luminosity, emits light of all colors like the atmosphere of a star. There used to be some doubt as to whether this was reflected or emitted light, but there can be no doubt now that it is emitted. The outer system of filaments, however, emits only certain definite rays, such as the red H Alpha line of hydrogen, as the greenish colored nebulae do.

This may be demonstrated in a striking manner by photography. If the nebula is photographed with a panchromatic plate so that light of all colors registers, we get an image which shows the inner bright mass strongly, but the filaments are relatively weak. But when a red filter and a special color-sensitive emulsion is used so that the range of light is restricted to the region around the red H Alpha line emitted by hydrogen, then the filaments come up in strong contrast while the inner bright mass is much weakened.

The Crab Nebula is so bright that it must be excited to shine by an exceedingly hot star. This star should be easy to locate because it should be so blue. There is a faint double near the center of the nebula which has long been under suspicion. Two astronomers at Mount Wilson, Baade and Minkowski, have made a special study of this star working as a team. Their results which were just recently published instead of settling anything tend rather to show how little we still know about stellar interiors.

Baade undertook the task of trying to measure the colors of the two components of the double. This was very difficult owing to the faintness of the star itself and because it is heavily obscured by the overlying nebulosity. The northern component of the double turned out to be about the color of the sun, so that obviously it is not the exciting star. The southern component was found to be white but not nearly white enough, its color temperature being at the most 20,000 K, which is disappointingly low. An examination of all the other stars in the vicinity down to the twentieth magnitude failed to reveal one that was excessively blue. It was very puzzling. How could such an enormous mass of gas keep shining brightly with no visible means of illumination? It was as puzzling as how some people manage to live comfortably without any visible means of support.

Despite Baade's negative result, it was hard to abandon the notion that the hotter southern component was somehow the source of energy supply. Perhaps there was something peculiar about the star that failed to show in its color alone. For example, it had long been known that stars of Class O are abnormally yellow, although their spectrum indicates they must be the hottest stars in the sky.

But if the color of the star was hard to get, its spectrum was doubly so. The star is covered by nebulosity to such an extent that there is scarcely any contrast left to distinguish between them. The only hope would be to try for a photograph on a night when the air is unusually calm so that the image of the star is exceptionally hard and sharp. Working at the 100-inch with a special nebular spectrograph, Minkowski was finally able to obtain one satisfactory plate. The exposure was made in such a way that the spectra of both components of the double star were photographed at one shot.

The plate showed the northern component to have a spectrum crossed by numerous dark lines like those in the sun, which agreed with Baade's estimate of its color. The southern component according to Baade should have a spectrum containing a few dark lines like those in a white star such as Rigel or Vega. But strangely enough, its spectrum resembled neither that of Rigel nor Vega nor any other star ever observed. For its spectrum was a blank. There were no lines in its spectrum at all!

Now a cool red star like Betelgeuse has a spectrum choked with long black bands and lines produced by molecules and atoms. A yellow star like the sun is too hot for the molecular bands, but there are still thousands of dark atomic lines. In white stars like Rigel most of the atoms are so highly ionized that practically all of the lines are gone. That is, as we go from cooler to hotter stars the spectrum keeps thinning out, as it were, until in the very hottest stars known of spectral class O-5 we find only a few lines left of hydrogen and ionized helium. The classification of O-O has been proposed for hypothetical stars so hot that no lines are left at all.

For the first time it appeared that here was a star of spectral class O-O. The inference was that it is so infernally hot that no atoms are left in its atmosphere capable of producing a visible absorption line. Yet there still remained the difficulty that Baade's observations showed it was much too yellow to have such a high temperature.

Whether this star is the source of luminosity for the Crab Nebula is still unsettled today. But on the tempting assumption that it *is* the true source, Minkowski has gone ahead and made some calculations which if verified will make this object one of the most startling in all uranology. His calculations are based upon quantum mechanical considerations so complex that only the results are reported here.

The star is a small body with a radius 1/50 that of the sun and with a mass about equal to that of the sun. This makes its average density so high that it must be in the white dwarf class—tiny stars of extremely high density composed of crushed atoms, or "degenerate" matter, as it is called.

The surface temperature of the sun is 6000° K. The surface temperature of the hottest stars is about 30,000° K. But according to Minkowski the surface temperature of the star at the center of the Crab Nebula is—hold your breath—500,000° K! Even with a radius 1/50 that of the sun its total luminosity would be equal to 30,000 suns.

The best way to gain some conception of the flood of radiation that would blast a planet revolving around such a sun is by comparison with our own system. We can always gain a rough idea of the temperature of the sun's surrounding at any point by calculating the "black sphere" temperature there; that is, the temperature a black body like a meteorite would have according to the laws of radiation. At the distance of the Earth, the black sphere temperature is 39° F, which is close enough to the temperature of the Earth to serve as a fairly reliable guide to planetary temperatures in general.

What would be the black sphere temperature of a meteorite revolving around a star like the one at the center of the Crab Nebula at the distance of the Earth? The answer is that it would not revolve as a recognizable meteorite very long because it would be speedily converted into a cloud of gas. Its black sphere temperature would be 5700° F, which is well above the vaporization point of the most refractory metal. Even at the distance of Pluto the black sphere temperature would be 925° F.

Not until the Earth were removed to a distance of five times that of Neptune would the temperature be reduced to that to which we are accustomed.

The Earth's atmosphere acts like a color filter that cuts off the ultraviolet light of the sun sharply at wave-length 2900 Angstroms. But since the sun only radiates feebly in the violet and ultraviolet. the great bulk of sunshine is able to penetrate on down to the surface. The sun radiates greenish-yellow light more intensely than any other.

For a star at 500,000°K the most intense radiation would be shifted out of the green, beyond the blue and violet, beyond the ultraviolet, clear out into the region of soft X rays. So much radiation would be in the far ultraviolet that the Earth's atmosphere would allow but 1/10,000 part of it to reach the surface—a lucky thing for us, too. Even with the ozone of the upper atmosphere to protect us we would still be in grave danger of injury to our eyes and skin.

A first glance, the combination of a star thirty thousand times as luminous as the sun with white dwarf characteristics seems like a flat contradiction of terms, for the white dwarfs are the feeblest radiators in the sky. But even this anomaly is found to fit into the picture and strengthen rather than weaken the theory. Indeed, the theory was proposed in 1939 by Chandrasekhar at the Paris conference on white dwarfs and novae, three years before Minkowski's investigation.

According to our present ideas on stellar evolution, a normal star toward the end of its life history is supposed to have contracted until at its center a dense core of degenerate matter has begun to develop, the first step into the senile white dwarf stage. But Chandrasekhar has shown that if a star exceeds a certain critical mass—about ten times that of the sun—it will be unable to develop a degenerate core in the normal manner. Instead the star will go right on contracting apparently without limit.

It is unthinkable, however, that this shrinking process could con-

DON'T WAIT...

Until there isn't an available copy of your favorite magazine. A whole year of reading pleasure, thrills and chills, can be had by just filling in this coupon and sending it to us immediately. Don't wait—act now!

ASTOUNDING SCIENCE-FICTION
122 EAST 42nd STREET
NEW YORK 17, N. Y.

Enclosed is $2.50. Kindly send me a year's subscription to ASTOUNDING SCIENCE-FICTION.

NAME ....................
ADDRESS ................
CITY ........... STATE.....

tinue indefinitely without eventually causing some drastic upheaval within the star's interior. Its only hope of salvation from becoming a cosmic flyspeck is to get below Chandrasekhar's critical mass value. So what happens? The star explodes. The surplus mass is sent flying off into space. After which the remaining mass goes ahead and develops a degenerate core as any normal white dwarf should.

Chandrasekhar suggests that this is what happens when we see a supernova—a massive star is getting rid of its surplus matter so that the remainder can collapse into a white dwarf. The mass of the Crab Nebula is estimated to be about equal to fifteen suns and the central star to one sun. This would mean that the explosion of 1054 A. D. blew away 15/16 of the original star.

Minkowski's figures show that at present about seventy percent of the star's interior is degenerate, the other thirty percent forming a brilliant atmospheric fringe.

If the star is an unfinished white dwarf, the transformation into the completely degenerate state can be expected in the not too distant future. Its luminosity will then sink rapidly from 30,000 suns down to less than 1/100 that of the sun. But long before this stage is reached, the Crab Nebula will have faded far below the light grasp of our largest telescopes and most sensitive recording devices.

The abnormal yellow color of the central star which Baade found is naturally explained by Minkowski's results. The correspondence between color and temperature is based upon laws deduced for an ideal unattainable perfect radiator. No star conforms exactly to these laws, not even a normal one like the sun. So it is not at all surprising that a half-breed white dwarf deviates widely in this respect.

We must remember also that our atmosphere allows us to see but 1/10,000 part of all the star's light. And just because the chink that does get through to us fails to look as white as it should, we dare to say that the other 9,999 parts are also abnormal!

It is like finding the broken toe bone of a dinosaur, and reasoning that because one little member is irregular the whole animal must have been deformed.

THE END.

* * * * * * * *

# The Ethical Equations

## by MURRAY LEINSTER

*Dedicated in a way, they were, to the proposition that virtue is, not its own reward, but apt to lead to fortuitous concatenations of subsequent events, let's say. Anyway, they did for one man—*

Illustrated by Williams

It is very, very queer. The Ethical Equations, of course, link conduct with probability, and give mathematical proof that certain patterns of conduct increase the probability of certain kinds of coincidences. But nobody ever expected them to have any really practical effect. Elucidation of the laws of chance did not stop gambling, though it did make life insurance practical. The Ethical Equations weren't expected to be even as useful as that. They were just theories, which seemed unlikely to affect anybody particularly. They were complicated, for one thing. They admitted that the ideal pattern of conduct for one man wasn't the best for another. A politician, for example, has an entirely different code—and properly—than a Space Patrol man. But still, on at least one occasion—

The thing from outer space was fifteen hundred feet long, and upward of a hundred and fifty feet through at its middle section, and well over two hundred in a curious bulge like a fish's head at its bow. There were odd, gill-like flaps just back of that bulge, too, and the whole thing looked extraordinarily like a monster, eyeless fish, floating in empty space out beyond Jupiter. But it had drifted in from somewhere beyond the sun's gravitational field—its speed was too great for it to have a closed orbit—and it swung with a slow, inane, purposeless motion about some axis it had established within itself.

The little spacecruiser edged closer and closer. Freddy Holmes had been a pariah on the *Arnina* all the way out from Mars, but he clenched his hands and forgot his misery and the ruin of his career in the excitement of looking at the thing.

"No response to signals on any frequency, sir," said the communications officer, formally. "It is not radiating. It has a minute magnetic field. Its surface temperature is just about four degrees absolute."

The commander of the *Arnina* said, "Hrrrmph!" Then he said, "We'll lay alongside." Then he looked at Freddy Holmes and stiffened. "No," he said, "I believe you take over now, Mr. Holmes."

Freddy started. He was in a very bad spot, but his excitement had made him oblivious of it for a moment. The undisguised hostility with which he was regarded by the skipper and the others on the bridge brought it back, however.

"You take over, Mr. Holmes," repeated the skipper bitterly. "I have orders to that effect. You originally detected this object and your uncle asked Headquarters that you be given full authority to investigate it. You have that authority. Now, what are you going to do with it?"

There was fury in his voice surpassing even the rasping dislike of the voyage out. He was a lieutenant commander and he had been instructed to take orders from a junior officer. That was bad enough. But this was humanity's first contact with an extrasolar civilization, and Freddy Holmes, lieutenant junior grade, had been given charge of the matter by pure political pull.

Freddy swallowed.

"I . . . I—" He swallowed again and said miserably, "Sir, I've tried to explain that I dislike the present set-up as much as you possibly can. I . . . wish that you would let me put myself under your orders, sir, instead of—"

"No!" rasped the commander vengefully. "You are in command, Mr. Holmes. Your uncle put on political pressure to arrange it. My orders are to carry out your instructions, not to wet-nurse you if the job is too big for you to handle. This is in your lap! Will you issue orders?"

Freddy stiffened.

"Very well, sir. It's plainly a ship and apparently a derelict. No crew would come in without using a drive, or allow their ship to swing about aimlessly. You will maintain your present position with relation to it. I'll take a spaceboat and a volunteer, if you will find me one, and look it over."

He turned and left the bridge. Two minutes later he was struggling into a spacesuit when Lieutenant Bridges—also junior grade—came briskly into the spacesuit locker and observed:

"I've permission to go with you, Mr. Holmes." He began to get into another spacesuit. As he pulled it up over his chest he added blithely: "I'd say this was worth the price of admission!"

Freddy did not answer. Three minutes later the little spaceboat pulled out from the side of the cruiser. Designed for expeditionary work and tool-carrying rather than as an escapecraft, it was not inclosed. It would carry men in spacesuits, with their tools and weapons, and they could breathe from its tanks instead of from their suits, and use its power and so conserve their own. But it was a strange feeling to sit within its spidery outline and see the great blank sides of the strange object draw near. When the spaceboat actually touched the vast metal wall it seemed impossible, like the approach to some sorcerer's castle across a monstrous moat of stars.

It was real enough, though. The felted rollers touched, and Bridges grunted in satisfaction.

"Magnetic. We can anchor to it. Now what?"

"We hunt for an entrance port," said Freddy curtly. He added: Those openings that look like gills are the drive tubes. Their drive's in front instead of the rear. Apparently they don't use gyros for steering.

The tiny craft clung to the giant's skin, like a fly on a stranded whale. It moved slowly to the top of the rounded body, and over it, and down on the other side. Presently the cruiser came in sight again as it came up the near side once more.

"Nary a port, sir," said Bridges blithely. "Do we cut our way in?"

"Hm-m-m," said Freddy slowly. "We have our drive in the rear, and our control room in front. So we take on supplies amidships, and that's where we looked. But this ship is driven from the front. Its control room might be amidships. If so, it might load at the stern. Let's see."

The little craft crawled to the stern of the monster.

"There!" said Freddy.

It was not like an entrance port on any vessel in the solar system. It slid aside, without hinges. There was an inner door, but it opened just as readily. There was no rush of air, and it was hard to tell if it was intended as an air lock or not.

"Air's gone," said Freddy. "It's

a derelict, all right. You might bring a blaster, but what we'll mostly need is light, I think."

The magnetic anchors took hold. The metal grip shoes of the spacesuits made loud noises inside the suits as the two of them pushed their way into the interior of the ship. The spacecruiser had been able to watch them, until now. Now they were gone.

The giant, enigmatic object which was so much like a blind fish in empty space floated on. It swung aimlessly about some inner axis. The thin sunlight, out here beyond Jupiter, smote upon it harshly. It seemed to hang motionless in midspace against an all-surrounding background of distant and unwinking stars. The trim Space Patrol ship hung alertly a mile and a half away. Nothing seemed to happen at all.

Freddy was rather pale when he went back to the bridge. The pressure mark on his forehead from the spacesuit helmet was still visible, and he rubbed at it abstractedly. The skipper regarded him with a sort of envious bitterness. After all, any human would envy any other who had set foot in an alien spaceship. Lieutenant Bridges followed him. For an instant there were no words. Then Bridges saluted briskly:

"Reporting back on board, sir, and returning to watch duty after permitted volunteer activity."

The skipper touched his hat sourly. Bridges departed with crisp precision. The skipper regarded Freddy with the helpless fury of a senior officer who has been ordered to prove a junior officer a fool, and who has seen the assignment blow up in his face and that of the superior officers who ordered it. It was an enraging situation. Freddy Holmes, newly commissioned and assigned to the detector station on Luna which keeps track of asteroids and meteor streams, had discovered a small object coming in over Neptune. Its speed was too high for it to be a regular member of the solar system, so he'd reported it as a visitor and suggested immediate examination. But junior officers are not supposed to make discoveries. It violates tradition, which is a sort of Ethical Equation in the Space Patrol. So Freddy was slapped down for his presumption. And he slapped back, on account of the Ethical Equations' bearing upon scientific discoveries. The first known object to come from beyond the stars ought to be examined. Definitely. So, most unprofessionally for a Space Patrol junior, Freddy raised a stink.

The present state of affairs was the result. He had an uncle who was a prominent politician. That uncle went before the Space Patrol Board and pointed out smoothly that his nephew's discovery was important. He demonstrated with mathematical precision that the Patrol was being ridiculous in ignoring a significant discovery simply because a junior officer had made it. And the Board, seething at outside interference, ordered Freddy to be taken to the object he had detected, given absolute command of the spacecruiser which had taken him there, and directed to make the examination he had suggested. By all the laws of probability, he would have to report that the hunk of matter from beyond the solar system was just like hunks of matter in it. And then the Board would pin back both his and his uncle's ears with a vengeance.

But now the hunk of matter turned out to be a fish-shaped artifact from an alien civilization. It turned out to be important. So the situation was one to make anybody steeped in Patrol tradition grind his teeth.

"The thing, sir," said Freddy evenly, "is a spaceship. It is driven by atomic engines shooting blasts sternward from somewhere near the bow. Apparently they steer only by hand. Apparently, too, there was a blow-up in the engine room and they lost most of their fuel out the tube vents. After that, the ship was helpless though they patched up the engines after a fashion. It is possible to calculate that in its practically free fall to the sun it's been in its present state for a couple of thousand years."

"I take it, then," said the skipper with fine irony, "that there are no survivors of the crew."

"It presents several problems, sir," said Freddy evenly, "and that's one of them." He was rather pale. "The ship is empty of air, but her tanks are full. Storage spaces containing what look like supplies are only partly emptied. The crew did not starve or suffocate. The ship simply lost most of her fuel. So it looks like they prepared the ship to endure an indefinite amount of floating about in free space and"—he hesitated—"then it looks like they went into suspended animation. They're all on board, in transparent cases that have—machinery attached. Maybe they thought they'd be picked up by sister ships sooner or later."

The skipper blinked.

"Suspended animation? They're alive?" Then he said sharply: "What sort of ship is it? Cargo?"

"No, sir," said Freddy. "That's

another problem. Bridges and I agree that it's a fighting ship, sir. There are rows of generators serving things that could only be weapons. By the way they're braced, there are tractor beams and pressor beams and—there are vacuum tubes that have grids but apparently work with cold cathodes. By the size of the cables that lead to them, those tubes handle amperages up in the thousands. You can figure that one out, sir."

The skipper paced two steps this way, and two steps that. The thing was stupendous. But his instructions were precise.

"I'm under your orders," he said doggedly. "What are you going to do?"

"I'm going to work myself to death, I suppose," said Freddy unhappily, "and some other men with me. I want to go over that ship backwards, forwards, and sideways with scanners, and everything the scanners see photographed back on board, here. I want men to work the scanners and technicians on board to direct them for their specialties. I want to get every rivet and coil in that whole ship on film before touching anything."

The skipper said grudgingly:

"That's not too foolish. Very well, Mr. Holmes, it will be done."

"Thank you," said Freddy. He started to leave the bridge, and stopped. "The men to handle the scanners," he added, "ought to be rather carefully picked. Imaginative men wouldn't do. The crew of that ship—they look horribly alive, and they aren't pretty. And . . . er . . . the plastic cases they're in are arranged to open from inside. That's another problem still, sir."

He went on down. The skipper clasped his hands behind his back and began to pace the bridge furiously. The first object from beyond the stars was a spaceship. It had weapons the Patrol had only vainly imagined. And he, a two-and-a-half striper, had to stand by and take orders for its investigation from a lieutenant junior grade just out of the Academy. Because of politics! The skipper ground his teeth—

Then Freddy's last comment suddenly had meaning. The plastic cases in which the alien's crew lay in suspended animation opened from the inside. From the inside!

Cold sweat came out on the skipper's forehead as he realized the implication. Tractor and pressor beams, and the ship's fuel not quite gone, and the suspended-animation cases opening from the inside—

There was a slender, coaxial cable connecting the two spacecraft, now. They drifted in sunward together. The little cruiser was dwarfed by the alien giant.

The sun was very far away; brighter than any star, to be sure, and pouring out a fierce radiation, but still very far from a warming orb. All about were the small, illimitably distant lights which were stars. There was exactly one object in view which had an appreciable diameter. That was Jupiter, a new moon in shape, twenty million miles sunward and eighty million miles farther along its orbit. The rest was emptiness.

The spidery little spaceboat slid along the cable between the two craft. Spacesuited figures got out and clumped on magnetic-soled shoes to the air lock. They went in.

Freddy came to the bridge. The skipper said hoarsely:

"Mr. Holmes, I would like to make a request. You are, by orders of the Board, in command of this ship until your investigation of the ship yonder is completed."

Freddy's face was haggard and worn. He said abstractedly:

"Yes, sir. What is it?"

"I would like," said the *Arnina's* skipper urgently, "to send a complete report of your investigation so far. Since you are in command, I cannot do so without your permission."

"I would rather you didn't, sir," said Freddy. Tired as he was, his jaws clamped. "Frankly, sir, I think they'd cancel your present orders and issue others entirely."

The skipper bit his lip. That was the idea. The scanners had sent back complete images of almost everything in the other ship, now. Everything was recorded on film. The skipper had seen the monsters which were the crew of the extrasolar vessel. And the plastic cases in which they had slumbered for at least two thousand years did open from the inside. That was what bothered him. They did open from the inside!

The electronics technicians of the *Arnina* were going about in stilly rapture, drawing diagrams for each other and contemplating the results with dazed appreciation. The gunnery officer was making scale, detailed design-drawings for weapons he had never hoped for, and waking up of nights to feel for those drawings and be sure that they were real. But the engineer officer was wringing his hands. He wanted to take the other ship's engines apart. They were so enormously smaller than the *Arnina's* drive, and yet they had driven a ship with eighty-four times the *Arnina's* mass—and he could not see how they could work.

The alien ship was ten thousand years ahead of the *Arnina*. Its secrets were being funneled over to the little Earth-ship at a rapid rate. But the cases holding its still-living crew opened from the inside.

"Nevertheless, Mr. Holmes," the skipper said feverishly, "I must ask permission to send that report."

"But I am in command," said Freddy tiredly, "and I intend to stay in command. I will give you a written order forbidding you to make a report, sir. Disobedience will be mutiny."

The skipper grew almost purple.

"Do you realize," he demanded savagely, "that if the crew of that ship is in suspended animation, and if their coffins or containers open only from inside—do you realize that they expect to open them themselves?"

"Yes, sir," said Freddy wearily. "Of course. Why not?"

"Do you realize that cables from those containers lead to thermobatteries in the ship's outer plating? The monsters knew they couldn't survive without power, but they knew that in any other solar system they could get it! So they made sure they'd pass close to our sun with what power they dared use, and went into suspended animation with a reserve of power to land on and thermobatteries that would waken them when it was time to set to work!"

"Yes, sir," said Freddy, as wearily as before. "They had courage, at any rate. But what would you do about that?"

"I'd report it to Headquarters!" raged the skipper. "I'd report that this is a warship capable of blasting the whole Patrol out of the ether and smashing our planets! I'd say it was manned by monsters now fortunately helpless, but with fuel enough to maneuver to a landing. And I'd asked authority to take their coffins out of their ship and destroy them! Then I'd—"

"I did something simpler," said Freddy. "I disconnected the thermobatteries. They can't revive. So I'm going to get a few hours' sleep. If you'll excuse me—"

He went to his own cabin and threw himself on his bunk.

Men with scanners continued to examine every square inch of the monster derelict. They worked in spacesuits. To have filled the giant hull with air would practically have emptied the *Arnina's* tanks. A spacesuited man held a scanner before a curious roll of flexible substance, on which were inscribed symbols. His headphones brought instructions from the photo room. A record of some sort was being duplicated by photography. There were scanners at work in the storerooms, the crew's quarters, the gun mounts. So far no single article had been moved from the giant stranger. That was Freddy's order. Every possible bit of information was being extracted from every possible object, but nothing had been taken away. Even chemical analysis was being done by scanner, using cold-light spectrography applied from the laboratory on the cruiser.

And Freddy's unpopularity had not lessened. The engineer officer cursed him luridly. The stranger's engines, now— They had been patched up after an explosion, and they were tantalizingly suggestive. But their working was unfathomable. The engineer officer wanted to get his hands on them. The physiochemical officer wanted to do some analysis with his own hands, instead of by cold-light spectrography over a scanner. And every man, from the lowest enlisted apprentice to the skipper himself, wanted to get hold of some artifact made by an alien, nonhuman race ten thousand years ahead of human civilization. So Freddy was unpopular.

But that was only part of his unhappiness. He felt that he had acted improperly. The Ethical Equations gave mathematical proof that probabilities and ethics are interlinked, so that final admirable results cannot be expected from unethical beginnings. Freddy had violated discipline—which is one sort of ethics—and after that through his uncle had interjected politics into Patrol affairs. Which was definitely a crime. By the Equations, the probability of disastrous coincidences was going to be enormous until corrective, ethically proper action was taken to cancel out the original crimes. And Freddy had been unable to devise such action. He felt, too, that the matter was urgent. He slept uneasily despite his fatigue, because there was something in the back of his mind which warned him stridently that disaster lay ahead.

Freddy awoke still unrefreshed and stared dully at the ceiling over his head. He was trying discouragedly to envision a reasonable solution when there came a tap on his door. It was Bridges with a batch of papers.

"Here you are!" he said cheerfully, when Freddy opened to him. "Now we're all going to be happy!"

Freddy took the extended sheets.

"What's happened?" he asked. "Did the skipper send for fresh orders regardless, and I'm to go in the brig?"

Bridges, grinning, pointed to the sheets of paper in Freddy's hand. They were from the physio-chemical officer, who was equipped

to do exact surveys on the lesser heavenly bodies.

"*Elements found in the alien vessel,*" was the heading of a list. Freddy scanned the list. No heavy elements, but the rest was familiar. There had been pure nitrogen in the fuel tank, he remembered, and the engineer officer was going quietly mad trying to understand how they had used nitrogen for atomic power. Freddy looked down to the bottom. Iron was the heaviest element present.

"Why should this make everybody happy?" asked Freddy.

Bridges pointed with his finger. The familiar atomic symbols had unfamiliar numerals by them. $H^3$, $Li^5$, $Gl^8$— He blinked. He saw $N^{15}$, $F^{18}$, $S^{34,35}$— Then he stared. Bridges grinned.

"Try to figure what that ship's worth!" he said happily. "It's all over the *Arnina*. Prize money isn't allowed in the Patrol, but five percent of salvage is. Hydrogen three has been detected on Earth, but never isolated. Lithium five doesn't exist on Earth, or glucinium eight, or nitrogen fifteen or oxygen seventeen or fluorine eighteen or sulphur thirty-four or thirty-five! The whole ship is made up of isotopes that simply don't exist in the solar system! And you know what pure isotopes sell for! The hull's practically pure iron fifty-five! Pure iron fifty-four sells for thirty-five credits a gram! Talk about the lost treasures of Mars! For technical use only, the stripped hull of this stranger is worth ten years' revenue of Earth government! Every man on the *Arnina* is rich for life. And you're popular!"

Freddy did not smile.

"Nitrogen fifteen," he said slowly. "That's what's in the remaining fuel tank. It goes into a queer little aluminum chamber we couldn't figure out, and from there into the drive tubes. I see—"

He was very pale. Bridges beamed.

"A hundred thousand tons of materials that simply don't exist on Earth! Pure isotopes, intact! Not a contamination in a carload! My dear chap, I've come to like you, but you've been hated by everyone else. Now come out and bask in admiration and affection!"

Freddy said, unheeding:

"I've been wondering what that aluminum chamber was for. It looked so infernally simple, and I couldn't see what it did—"

"Come out and have a drink!" insisted Bridges joyously. "Be lionized! Make friends and influence people!"

"No," said Freddy. He smiled mirthlessly. "I'll be lynched later anyhow. Hm-m-m. I want to talk to the engineer officer. We want to get that ship navigating under its own power. It's too big to do anything with towlines."

"But nobody's figured out its engines!" protested Bridges. "Apparently there's nothing but a tiny trickle of nitrogen through a silly chamber that does something to it, and then it flows through aluminum baffles into the drive tubes. It's too simple! How are you going to make a thing like that work?"

"I think," said Freddy, "it's going to be horribly simple. That whole ship is made up of isotopes we don't have on Earth. No. It has aluminum and carbon. They're simple substances. Theirs and ours are just alike. But most of the rest—"

He was pale. He looked as if he were suffering.

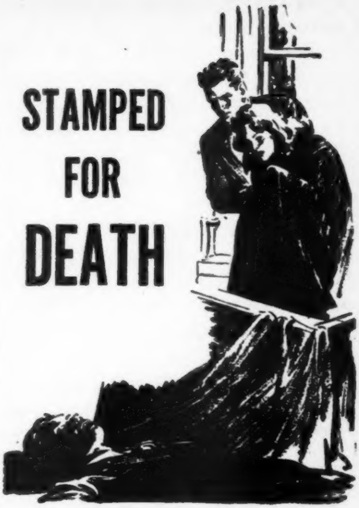
"I'll get a couple of tanks made up, of aluminum, and filled with nitrogen. Plain air should do— And I'll want a gyro-control. I'll want it made of aluminum, too, with graphite bearings—"

He grinned mirthlessly at Bridges.

"Ever hear of the Ethical Equations, Bridges? You'd never expect them to suggest the answer to a space-drive problem, would you? But that's what they've done. I'll get the engineer officer to have those things made up. It's nice to have known you, Bridges—"

As Bridges went out, Freddy Holmes sat down, wetting his lips, to make sketches for the engineer officer to work from.

The control room and the engine room of the monster ship were one. It was a huge, globular chamber filled with apparatus of startlingly alien design. To Freddy, and to Bridges too, now, there was not so much of monstrousness as at first. Eight days of familiarity, and knowledge of how they worked, had made them seem almost normal. But still it was eerie to belt



STAMPED FOR DEATH

They were only two-and-a-half-penny orange stamps from the British Solomon Islands—but they were worth $20,000 to a certain collector.

Gary Barden had to find out why—in order to prove his identity and his innocence in two murders!

And that's when The Shadow stepped into one of the strangest assignments of his career in THREE STAMPS OF DEATH. Read this thrilling tale in the June issue of

THE SHADOW

AT ALL NEWSSTANDS

themselves before the instrument board, with only their hand lamps for illumination, and cast a last glance at the aluminum replacements of parts that had been made on some planet of another sun.

"If this works," said Freddy, and swallowed, "we're lucky. Here's the engine control. Cross your fingers, Bridges."

The interior of the hulk was still airless. Freddy shifted a queerly shaped lever an infinitesimal trace. There was a slight surging movement of the whole vast hull. A faint murmuring came through the fabric of the monster ship to the soles of their spacesuit boots. Freddy wet his lips and touched another lever.

"This should be lights."

It was. Images formed on the queerly shaped screens. The whole interior of the ship glowed. And the whole creation had been so alien as somehow to be revolting, in the harsh white light of the hand lamps the men had used. But now it was like a highly improbable fairy palace. The fact that all doors were circular and all passages round tubes was only pleasantly strange, in the many-colored glow of the ship's own lighting system. Freddy shook his head in his spacesuit helmet, as if to shake away drops of sweat on his forehead.

"The next should be heat," he said more grimly than before. "We do not touch that! Oh, definitely! But we try the drive."

The ship stirred. It swept forward in a swift smooth acceleration that was invincibly convincing of power. The *Arnina* dwindled swiftly, behind. And Freddy, with compressed lips, touched controls here, and there, and the monstrous ship obeyed with the docility of a willing, well-trained animal. It swept back to clear sight of the *Arnina*.

"I would say," said Bridges in a shaking voice, "that it works. The Patrol has nothing like this!"

"No," said Freddy shortly. His voice sounded sick. "Not like this! It's a sweet ship. I'm going to hook in the gyro controls. They ought to work. The creatures who made this didn't use them. I don't know why. But they didn't."

He cut off everything but the lights. He bent down and hooked in the compact little aluminum device which would control the flow of nitrogen to the port and starboard drive tubes.

Freddy came back to the control board and threw in the drive once more. And the gyro control worked. It should. After all, the tool work of a Space Patrol machinist should be good. Freddy tested it thoroughly. He set it on a certain fine adjustment. He threw three switches. Then he picked up one tiny kit he had prepared.

"Come along," he said tiredly. "Our work's over. We go back to the *Arnina* and I probably get lynched."

Bridges, bewildered, followed him to the spidery little spaceboat. They cast off from the huge ship, now three miles or more from the *Arnina* and untenanted save by its own monstrous crew in suspended animation. The Space Patrol cruiser shifted position to draw near and pick them up. And Freddy said hardly:

"Remember the Ethical Equations, Bridges? I said they gave me the answer to that other ship's drive. If they were right, it couldn't have been anything else. Now I'm going to find out about something else."

His spacegloved hands worked clumsily. From the tiny kit he spilled out a single small object. He plopped it into something from a chest in the spaceboat—a mortar shell, as Bridges saw incredulously. He dropped that into the muzzle of a line-mortar the spaceboat carried as a matter of course. He jerked the lanyard. The mortar flamed. Expanding gases beat at the spacesuits of the men. A tiny, glowing, crimson spark sped toward outer space. Seconds passed. Three. Four. Five—

"Apparently I'm a fool," said Freddy, in the grimmest voice Bridges had ever heard.

But then there was light. And such light! Where the dwindling red spark of a tracer mortar shell had sped toward infinitely distant stars, there was suddenly an explosion of such incredible violence as even the proving-grounds of the Space Patrol had never known. There was no sound in empty space. There was no substance to be heated to incandescence other than that of a half-pound tracer shell. But there was a flare of blue-white light and a crash of such violent static that Bridges was deafened by it. Even through the glass of his helmet he felt a flash of savage heat. Then there was—nothing.

"What was that?" said Bridges, shaken.

"The Ethical Equations," said Freddy. "Apparently I'm not the fool I thought—"

The *Arnina* slid up alongside the little spaceboat. Freddy did not alight. He moved the boat over to its cradle and plugged in his communicator set. He talked over that set with his helmet phone, not radiating a signal that Bridges could pick up. In three minutes or so the great lock opened and four spacesuited figures came out. One wore the crested four-communicator helmet which only the skipper of a cruiser wears when in command of a landing party. The newcomers to the outside of the *Arnina's* hull crowded into the little spaceboat. Freddy's voice sounded again in the headphones, grim and cold.

"I've some more shells, sir. They're tracer shells which have been in the work boat for eight days. They're not quite as cold as the ship, yonder—that's had two thousand years to cool off in—but they're cold. I figure they're not over eight or ten degrees absolute. And here are the bits of material from the other ship. You can touch them. Our spacesuits are as nearly nonconductive of heat as anything could be. You won't warm them if you hold them in your hand."

The skipper—Bridges could see him—looked at the scraps of metal Freddy held out to him. They were morsels of iron and other material from the alien ship. By the cold glare of a handlight the skipper thrust one into the threaded hollow at the nose of a mortar shell into which a line-end is screwed when a line is to be thrown. The skipper himself dropped in the mortar shell and fired it. Again a racing, receding speck of red in emptiness. And a second terrible, atomic blast.

The skipper's voice in the headphones:

"How much more of the stuff did you bring away?"

"Three more pieces, sir," said Freddy's voice, very steady now. "You see how it happens, sir. They're isotopes we don't have on Earth. And we don't have them because in contact with other isotopes at normal temperatures, they're unstable. They go off. Here we dropped them into the mortar shells and nothing happened, because both isotopes were cold—down to the temperature of liquid helium, or nearly. But there's a tracer compound in the shells, and it burns as they fly away. The shell grows warm. And when either isotope, in contact with the other, is as warm as . . . say . . . liquid hydrogen . . . why . . . they destroy each other. The ship yonder is of the same material. Its mass is about a hundred thousand tons. Except for the aluminum and maybe one or two other elements that also are nonisotopic and the same in both ships, every bit of that ship will blast off if it comes in contact with matter from this solar system above ten or twelve degrees absolute."

"Shoot the other samples away," said the skipper harshly. "We want to be sure—"

There were three violent puffs of gases expanding into empty space. There were three incredible blue-white flames in the void. There was silence. Then—

"That thing has to be destroyed," said the skipper, heavily. "We couldn't set it down anywhere, and its crew might wake up anyhow, at any moment. We haven't anything that could fight it, and if it tried to land on Earth—"

The alien monster, drifting aimlessly in the void, suddenly moved. Thin flames came from the gill-like openings at the bow. Then one side jetted more strongly. It swung about, steadied, and swept forward with a terrifying smooth acceleration. It built up speed vastly more swiftly than any Earth-ship could possibly do. It dwindled to a speck. It vanished in empty space.

But it was not bound inward toward the sun. It was not headed for the plainly visible half-moon disk of Jupiter, now barely seventy million miles away. It headed out toward the stars.

"I wasn't sure until a few minutes ago," said Freddy Holmes unsteadily, "but by the Ethical Equations something like that was probable. I couldn't make certain until we'd gotten everything possible from it, and until I had everything arranged. But I was worried from the first. The Ethical Equations made it pretty certain that if we did the wrong thing we'd suffer for it . . . and by we I mean the whole Earth, because any visitor from beyond the stars would be bound to affect the whole human race." His voice wavered a little. "It was hard to figure out what we ought to do. If one of our ships had been in the same fix, though, we'd have hoped for—friendliness. We'd hope for fuel, maybe, and help in starting back home. But this ship was a war-ship, and we'd have been helpless to fight it. It would have been hard to be friendly. Yet, according to the Ethical Equations, if we wanted our first contact with an alien civilization to be of benefit to us, it was up to us to get it started back home with plenty of fuel."

"You mean," said the skipper, incredulously, "you mean you—"

"Its engines use nitrogen," said Freddy. "It runs nitrogen fifteen into a little gadget we know how to make, now. It's very simple, but it's a sort of atom smasher. It turns nitrogen fifteen into nitrogen fourteen and hydrogen. I think we can make use of that for ourselves. Nitrogen fourteen is the kind we have. It can be handled in aluminum pipes and tanks, because there's only one aluminum, which is stable under all conditions. But when it hits the alien isotopes in the drive tubes, it breaks down—"

He took a deep breath.

"I gave them a double aluminum tank of nitrogen, and by-passed their atom smasher. Nitrogen fourteen goes into their drive tubes, and they drive! And . . . I figured back their orbit, and set a gyro to head them back for their own solar system for as long as the first tank of nitrogen holds out. They'll make it out of the sun's gravitational field on that, anyhow. And I reconnected their thermobatteries. When they start to wake up they'll see the gyro and know that somebody gave it to them. The double tank is like their own and they'll realize they have a fresh supply of fuel to land with. It . . . may be a thousand years before they're back home, but when they get there they'll know we're friendly and . . . not afraid of them. And meanwhile we've got all their gadgets to work on and work with—"

Freddy was silent. The little spaceboat clung to the side of the *Arnina,* which with its drive off was now drifting in sunward past the orbit of Jupiter.

"It is very rare," said the skipper ungraciously, "that a superior officer in the Patrol apologizes to an inferior. But I apologize to you, Mr. Holmes, for thinking you a fool. And when I think that I, and certainly every other Patrol officer of experience, would have thought of nothing but setting that ship down at Patrol Base for study, and when I think what an atomic explosion of a hundred thousand tons of matter would have done to Earth . . . I apologize a second time."

Freddy said uncomfortably:

"If there are to be any apologies made, sir, I guess I've got to make them. Every man on the *Arnina* has figured he's rich, and I've sent it all back where it came from. But you see, sir, the Ethical Equations—"

When Freddy's resignation went in with the report of his investigation of the alien vessel, it was returned marked *"Not Accepted."* And Freddy was ordered to report to a tiny, hard-worked spacecan on which a junior Space Patrol officer normally gets his ears pinned back and learns his work the hard way. And Freddy was happy, because he wanted to be a Space Patrol officer more than he wanted anything else in the world. His uncle was satisfied, too, because he wanted Freddy to be content, and because certain space-admirals truculently told him that Freddy was needed in the Patrol and would get all the consideration and promotion he needed without any politicians butting in. And the Space Patrol was happy because it had a lot of new gadgets to work with which were going to make it a force able not only to look after interplanetary traffic but defend it, if necessary.

And, for that matter, the Ethical Equations were satisfied.

THE END.

The

MINNOW

who became

a SHARK....

It might be you . . . if you had Gordon Mullen as a swimming instructor! This famous producer of champions has instructed Olympic stars, international record holders, national champions—and now **you** can read how he does it!

In the first of two articles, in the August issue of TRUE SPORT PICTURE STORIES, Mr. Mullen gives his own tricks of the trade in swimming . . . how to relax, how to breathe, how to diet, and so forth. The same pointers that proved so valuable to the champions are now available to you in another TRUE SPORT PICTURE STORIES exclusive!

Plus other thrilling features and articles of the world of sports—with sixteen pages of gravure, and many pages of brilliant color. Get your copy of the August issue now. It goes on sale May 18th at all newsstands.

TRUE
SPORT
PICTURE STORIES

AUGUST ISSUE — 10c A COPY

# Brass Tacks

*That's a possibility, too!*

Dear Sir:

I'm writing this in response to the letter of Lawrence Markus in the February Brass Tacks section. His assumption that the square of "c" would vary as the units chosen is based on one of the most common errors found in the squaring of units and then converting them. Namely: the failure to *square* the *conversion factor.* In the problem chosen where $C^2 = 9 \times 10^{20}$ cm/sec or $3.46 \times 10^{10}$ miles/sec., Mr. Markus multiplied by the linear factor of conversion, $1.6 \times 10^5$. This should have been squared, which is $2.56 \times 10^{10}$. Multiplied by the above figure of $3.46 \times 10^{10}$ miles/sec gives $8.86 \times 10^{20}$ cm/sec. The error between 9 and 8.86 is, of course, due to failure to carry out decimal places.

Doubtless a number of other readers have by now similarly cleared up this point.—Paul Box.

---

*Sorry—you're wrong. If Hydrogen is taken as 1.0, then Helium is not 4.032 but 3.963 plus. And the proportion of Hydrogen of atomic weights 2 and 3 is nowhere near great enough to give the 1.008 figure. Further, the atomic weight of Hydrogen can be determined by nonchemical means that in effect, weigh the gas one atom at a time. The answer is still 1.008/16.000ths that of Oxygen, or1.008/4.000ths that of Helium.*

Dear Mr. Campbell:

After reading the letters in the February Astounding concerning "c-squared," I thought about another little matter which seems phony to me and which I have not found definitely cleared up in quite a bit of reading. It has come to my attention several times and if the hypothesis is in error it should be eliminated from the fan repertoire.

In your editorial "The Next Decimal Place" in the January issue you say that the whole universe is lighted, heated and consumed by the energy which is represented by the figure—.008—in Hydrogen's atomic weight of 1.008.

Here are the facts and conclusions as I see them in regard to your statement which I shall hereinafter call "the hypothesis."

First, the atomic weights of the elements, as you say, are based on the arbitrary standard of Oxygen which is *given* the atomic weight of 16. Formerly when Hydrogen at at. wt. 1 was the standard, the .008 was nonexistent and Helium had the value of 4.032. As far as the hypothesis goes it might be more reasonable to accept these figures on the basis that it is easier to shove something downstairs than to shove it upstairs. In other words that the Helium breaks up to form Hydrogen with a consequent release of energy equal to .032.

However, a variety of arbitrarily designated standards for atomic weights give a variety of weights for H and He with a consequent variation in the magnitude and location of that portion of the atomic weight which is supposedly given off as energy in the stellar processes. This argument alone should suffice to dispose of the hypothesis as an absurdity.

Further, it has been determined that most if not all elements have isotopes, that is chemically identical counterparts of the original except for a difference in atomic weight. Hydrogen of *Atomic weight 1 on the Oxygen standard* has isotopes of at. wt. 2 and 3. The H isotope with weight 2 is easily remembered in the "heavy water" discovery of a few years back. Now the proportion of the three H isotopes in a volume of hydrogen is such as to give all Hydrogen the average atomic weight of 1.008. The point-o-o-eight is nonexistent as an actuality and the hypothesis is passé.

Am I right or wrong?

If anyone is interested in starting a "dtp club"—detect the phonies—drop me a card and let's get together.

Padgett's "situation" takes first place in the stories, with Leiber second. "Nomad" is third only because Jameson's story is worse. Let's have more Brass Tacks as interesting as this last one. I go for that rotogravure especially when it concerns astronomical subjects. Keep up the good work.—Dale Tarr, 703 Jackson, Anderson, Indiana.

---

*If a sky hook will anchor well in a vacuum, it might help in electron tube design.*

Dear Campbell:

May I offer my product? The Long Mfg. Co. manufactures a complete line of Non-Slip Skyhooks, which together with the Long Neverslip Hemp, can be used to hang screwballs who take up valuable space prating about solid vacuums, etcetera—and especially liquid vacuums.

The only necessary caution is to insert the Non-Slip Skyhook in a seldom-used location since once inserted, it can not be removed, and will forever afterward become a menace to aerial navigation, building-plans, et cetera.—Wes Long.

# Engineering In Extremes

## by R. S. RICHARDSON

Extremes are always fascinating. There is nothing that can get our attention quite so quickly as being told we are looking at the biggest, the smallest, the best, or rarest of its kind in existence. Our daily life is carried on in a world of averages where there is little variation one way or the other. But on going to extremes we immediately get into the fantastic and incredible—incredible simply because it is contrary to ordinary experience. Absolutely, of course, there is no such thing as the extreme or incredible. What seems like an extreme state of something to us would be entirely normal to a being from some other part of space. Thus gaseous tungsten is unfamiliar to a Terrestrian but presents no unusual features to a Sirian. Likewise solid metallic looking hydrogen would strike us as a bit out of the ordinary, while a Jovian would gasp if told a dirigible was filled with the same element.

In a lecture before the Institute of Civil Engineers, Sir Charles Darwin, the eminent British physicist, undertook to illustrate some of the extreme properties of matter by describing how the ship *Queen Elizabeth* would be rebuilt employing only matter in its extreme state. Although his efforts finally ended in disaster it is interesting to follow them through to their tragic conclusion.

From considerations based on the crystalline structure of metals he proposed to use a metal one hundred times as strong as that used in the present ship. This enabled him to build the vessel with 1/100th of the weight of the material. As the present ironwork weighs thirty thousand tons this brought the weight of the ship down to three hundred tons. The difficulty now arose that to get the required displacement it would be necessary to ballast it with nearly thirty thousand tons before the cargo could be put in.

Now the densest material known is found in the white dwarf stars. It is so heavy that seventeen cubic feet would make up the required thirty thousand tons. The trouble would come in maintaining the white dwarf matter in its highly compressed state. For in order to do so it must be kept under a pressure of one billion atmospheres and a temperature of one hundred million degrees. As this seemed rather awkward to Sir Charles, he discarded the white dwarf stuff in favor of a block of osmium in the form of a cube thirty-six feet to the side.

Attention was now turned to the machinery. The logical choice for an engine would be one that runs on atomic energy. But it will in any event have to raise steam for the turbine, so that the engine room will always have to be quite large. For the auxiliary machinery, however, advantage could be taken of the superconductivity of certain metals at extremely low temperatures. For this reason the wiring of the ship would be entirely of tin or lead cooled by liquid helium. Copper would not do because it is not a superconductor. But the magnets in the dynamos would be practically unchanged.

At this point Sir Charles asked: Why stop with a few minor adjustments in the ship? Why not really go the limit and alter the composition of the ocean itself?

For example, there would some tremendous advantages accrue from sailing the ship not in water but in a sea of liquid helium II. This is one of the most remarkable substances ever produced in the laboratory. Helium has the lowest known boiling point of any element of 4° absolute. At this temperature the liquid exhibits no especially unusual properties. It has a density one-tenth that of water and a density and specific heat similar to other gases. But get its temperature down to 2° and a most unexpected change sets in. The viscosity suddenly drops until it almost vanishes completely while the heat conductivity increases enormously, becoming one hundred times better than copper. The exact character of this liquid helium II is still a matter of controversy among cryological authorities. This much, however, is agreed upon: A solid body would move through helium II with not merely the greatest of ease but with practically no effort at all. It would also be impossible to keep bodies at different temperatures in its presence. But its most astounding property of all is its apparent defiance of the laws of hydrostatics. If a tea cup were filled with helium II, in a few minutes the liquid would creep over the rim of the cup into the saucer, and then onto the table, until finally the level of the liquid would be the same all over whatever space was available.

Now picture the renovated *Queen Elizabeth* launched in such a sea. No special cooling system would be needed for the superconductivity of the electric wires. Ninety percent of the ballast could be thrown away since the density of the ocean has been reduced by ninety percent. It might even be possible to omit the engine altogether and merely give the ship a healthy shove at the start provided buffers were available on the receiving end of the trip.

But before many miles of the maiden voyage had been covered tragedy would surely strike. For immediately the helium II would start to creep up the sides of the ship, over the bulwarks, across the deck, down the companionways, until it finally settled in the hold in an effort to come to the same level inside as out.

And as Sir Charles mournfully concludes, "Deeper and deeper will grow the liquid in the hold, and deeper and deeper the ship will settle, until at last my imaginary ship will founder in the depths of my imaginary ocean."

THE END

# The Golden Journey

## by BERTRAM CHANDLER

***There's apt to be trouble on a prison ship bound for a penal asteroid. That the officers knew. But they weren't aware that they were also headed in for a dose of double-trouble! And twins can cause identity trouble anywhere.***

**Illustrated by Orban**

It was at the airport that the commander first met Valerie Wayne.

Perhaps it was some dim foreknowledge of this that accounted for the fascination the place had always held for him. Perhaps—and, knowing the man, I prefer this, his own explanation—it was just that he was acutely conscious of the romance of modern transport. If there had been a god of that name, he would have been its high priest.

Be that as it may, he was always there long before the I.C.C. transport was due to take off for Port Revenal, our Saharan landing field. He would sit on the bench under the clock tower, you know, the one with all the faces showing Standard Times for all over the world, ostensibly waiting for the juniors to arrive and report their return from leave.

The airport staff knew him, apart from anything else the black and gold astronaut's uniform made him an object of envy and admiration in any crowd, and on the days when the officers of *Thunderbird* were due to return to their ship the bench was religiously kept clear.

And there he would sit, having caught the early morning plane in from London, a tall, spare figure, hair a little gray at the temples, whose ascetic face suggested the prelate rather than the man of action, savoring the atmosphere of his surroundings with obvious, but quiet, enjoyment.

Any other man with several hours hanging on his hands would have seen more of Paris than this latter day caravansary on its outskirts, would have sampled some, at least, of the pleasures for which that city is justly famous. But all the commander asked was the milling crowds, the gesticulating officials in their smart, colorful uniforms, the multilingual loudspeakers blaring arrivals and departures and, over all, the great silver wings of the stratoliners.

And he would rise courteously to return our salutes as we strolled in from the distant corner of the field where the whirling blades of the rising and descending gyro taxis glittered continuously in the sunshine. If, as often was the case, we had brought our girls along to see us off, he would exchange a few words with them in his deep, well-modulated voice, but it was almost as though he was afraid of them. With the married women it was different, but with them he was on surer ground. For they accompanied their husbands to Port Revenal, for a last week together whilst we of the permanent staff took over from our reliefs and insured that *Thunderbird* was ready in all respects for deep space.

I asked Molly, once, what she thought of his attitude toward women.

"He's scared, Peter," she said. "With us safely married matrons he feels he's safe, but unmarried girls, to him, are just mantraps baited with sex appeal. It's a case of once bitten, twice shy. There's a tragedy in his life, somewhere. And he's scared of having to go through it all again."

"It's a pity," she sighed, "he'd make some lucky girl a good husband. I'm not sure that he's safe even from us old married women—"

And I told her that if that was the way she felt I'd never have her down to Port Revenal again.

But it was at the Paris airport, as I said, that he first met Valerie Wayne.

The I.C.C. transport was already on the tarmac, blue wisps of smoke trickling from the ventures as the pilot warmed up his jets. Everybody was aboard, even the cadets. A little to one side, outside the roped-off area, stood a small group of girls, their gay, summer dresses billowing ever so slightly in the light breeze.

Everybody was aboard but Hamilton, the second pilot.

The commander strolled forward along the aisle, had a few brief words with the transport captain. Then he descended to the tarmac to pace up and down by the retractable gangway. One did not have to be psychic to realize that Mr. Hamilton had incurred his extreme displeasure.

Then, drifting down from the blue sky on almost soundless wings, came one of the little gyro taxis. It grounded but a few feet from where the commander was pacing back and forth. Two of the airport officials sprang forward to deal with this violator of the traffic rules, but, at the sight of the I.C.C. black and gold they shrugged, grinned and saluted.

Hamilton climbed down from the taxi, then turned to assist his companion to the ground.

"I wonder who she is?" breathed Molly, sitting beside me. "But how does she do it? Everything so simple, and yet such effect!"

Effect was the word.

The young woman with Hamilton was tall and slim, and was dressed almost with severity. Her hair, black, with vagrant coppery gleams, was brushed smoothly back and was devoid of ornament. And she was like one of those too exquisitely elegant ladies one sees on the illustrated fashion pages of the better-class women's magazines. No, not quite. For, in spite of her poise, there was something warmly human about her.

"Sorry I'm late, sir!" we heard Hamilton say. And then, "Valerie, I'd like you to meet Commander Cartwright, our navigating and executive officer. Commander, this is Miss Valerie Wayne."

Those of us inside the plane could hardly believe our ears. For we heard the commander say, "The pleasure is mine, Miss Wayne. But haven't we met before?"

"He's as bad as all the rest of you after all!" hissed Molly. "I *did* expect something original—"

"No, I don't think so, commander," replied the girl in what, if she hadn't been turning on the refrigeration, would have been a very pleasant contralto. Then her manner softened. "But you may have seen me over the air. I've televised quite a lot recently."

"Valerie is secretary of the Penal Reform League," interjected Hamilton with a proprietorial air. "And she's their star speaker."

"Really?" This time it was the commander's turn to be as unpleasant as possible within the bounds of ordinary politeness. "I'm afraid, Miss Wayne, that I haven't much time for the P.R.L., but then, of course, I have a slight personal bias. But you must excuse us—" He turned to where one of the port officials, obviously a person of some importance, had been standing vainly trying to attract his attention during the exchange of courtesies. *"Mais certainment, Monsieur le Capitane. Nous allons, tres vite."* Then, to the second pilot, "Come on, Mr. Hamilton. You have caused so much delay that you have disrupted the smooth functioning of the port." He saluted. "I'm very pleased to have met you, Miss Wayne."

"The pleasure was all mine, commander.

"But I, too, have what you call a slight personal bias. And if you had one near and dear to you rotting her life away in the little hell they call Ceres, you, I think, would be one of our most ardent supporters." Then, as Hamilton made to take her hand in farewell, she drew him to her and planted a kiss full on his lips. "Au revoir, Jim," she murmured, "don't be too long away—"

"That was meant for the commander," whispered Molly.

"What?"

"Sure. A shade more subtle than the slap in the face he was asking for."

"But why should *he* worry if she kisses my Number Two?"

"How blind men are. Why should he care what she's secretary of—"

Followed by the second pilot, Cartwright climbed into the transport. The glare he cast over us discouraged comment. On the tarmac, the gold-braided airport official glanced anxiously at his watch. The doors shut. The blast turbines woke into screaming life and we fled south and east for Port Revenal.

The week before blasting off was always a busy one.

The relief crew, to be sure, do their work efficiently and well, but their lives don't depend upon it. Then there was cargo to be stowed—the usual outward bound general—with due regard for the center of gravity. This, of course, wouldn't matter in deep space, but it has to be kept as low as possible to facilitate landing.

The passengers, if any, wouldn't be down till the actual sailing day. With them would come plane after plane packed tight with rubbernecks—for the departure of a rocket ship is always a sight to stir the imagination. You know, I have even known people to complain most bitterly that the Rocket Lines have no consideration for the public in that respect—they always have their ports miles from anywhere.

Of course they do. They didn't—once. And then . . . oh, it's years ago, before my time . . . Captain Taylor blew a tube, and his ship, *King Charles' Wain,* sat down, hard, bang in the middle of Manchester. The people of that city, at least, would have remembered, but there weren't any left even to pass unfavorable comment on the occurrence.

But for a day or so the little group of buildings to one side of the landing field would become almost a city. Sometimes they've even had to put up tents.

The Old Man usually came down the day before the passengers were due to arrive. Then he, and the commander, and old Captain Jorgen, the routeing officer, would go into a huddle about *Thunderbird's* orbit, having due regard to all known navigational dangers and the tracks of any other shipping in space.

So it caused considerable speculation when Captain Wilton returned a full three days before the expiry of his leave. He went at once to his private quarters in the Officers' Hall, and sent for the commander.

News gets around.

Soon everybody—officers, officers' wives, and cadets—was gathered in the comfortable lounge. I don't know why or how, but all of us were convinced that any change from our familiar routine wouldn't be a change for the better.

At last the bell of the telephone from the Old Man's suite jangled insistently. One of the cadets answered. "It's for you, sir," he said.

"What is it?" everybody screamed when I hung up.

"I don't know. But I've been told to stop the loading and start getting the stuff out again. Also, and this will please you all, the sailing's been postponed for a week. But I must go and make myself even more popular with the stevedore—"

It wasn't till after dinner that night that we learned the worst. The Old Man called an officers' conference in his sitting room.

"Well, gentlemen," he said, "they've done the dirty on us. Any of you with girl friends in Port Lasalle won't be seeing 'em this trip—"

"Where are they sending us, sir?" blurted somebody.

Captain Wilton raised his hand.

"Quiet, gentlemen, please.

"Our Ganymede sailing has been canceled, and we are to replace the rocket that blew a tube just before taking off at Port Curtiss in Arizona. They reckon it'll be some months before they have her spaceworthy again. We shall be taking her cargo and her passengers."

"Not *Charon*, sir?"

"Yes, *Charon*. Regarding the passengers, there are about fifty traveling at the government's expense and one, I think, who is a round-tripper. The others—ten guards and forty incurables."

"Any outward cargo?"

"Yes—general. And homeward. It appears that the . . . er . . . colonists can pile up a little credit on Earth for the purchase of imported luxuries. The usual routine, up till now, has been for *Charon* to disembark her passengers and discharge her outward freight at Port Howard, or, as *they* call it, Port Capone, and then pick up labor to work the indium mines on Number 596. When she is loaded, she returns to Port Capone, disembarks the labor, and carries on home with the ore. The money earned by the miners is credited to them by the government, and forms a fund from which they can buy anything from Earth that they require."

"This passenger, sir?" asked Hamilton.

"The roundtripper, you mean? We've far more important things to worry about than one passenger, Mr. Hamilton. I can't even remember her name."

*Her* name.

The second pilot looked very pleased with himself.

"Of course, sir. Thank you, sir."

"And now, gentlemen, the commander and I are going to be very busy. All kinds of structural alterations to be planned. Mr. Jones, here's a pile of bumf from the Board. Run through it yourself with the juniors so you have an idea as to what's happening."

Yes, we all got an idea as to what was happening, and what was likely to happen. And we weren't impressed.

Firstly, we couldn't get rid of the idea that *Thunderbird*, through no fault of her own, had come down in the world. You know the kind of thing—once the pride of the

Jovian run and now—a *prison ship.* Only for one trip, perhaps, but that was plenty. The smell would linger for years.

And then—all the structural changes and such. All spacemen are, at heart, deeply conservative, and when a ship fits you like a well-worn shoe you object to any uncalled for and unwanted cobbling.

To begin with, the passenger quarters were to be fitted with a door that would stop anything short of a rocket on the Pluto run at maximum acceleration. And this door wasn't to have the kind of lock that had an orthodox key—oh, no, that was too simple. It was to be one of the new-fangled acoustic locks—and only the right word spoken by the right voice would open the door Only two officers were to know the word, the Old Man and the commander, and the lock would be set to the timbre of their voices only.

Then there were changes in the engiene room, too.

A new converter was to be installed — *Thunderbird* was to manufacture her own atomic blasting explosives for use in the indium mines.

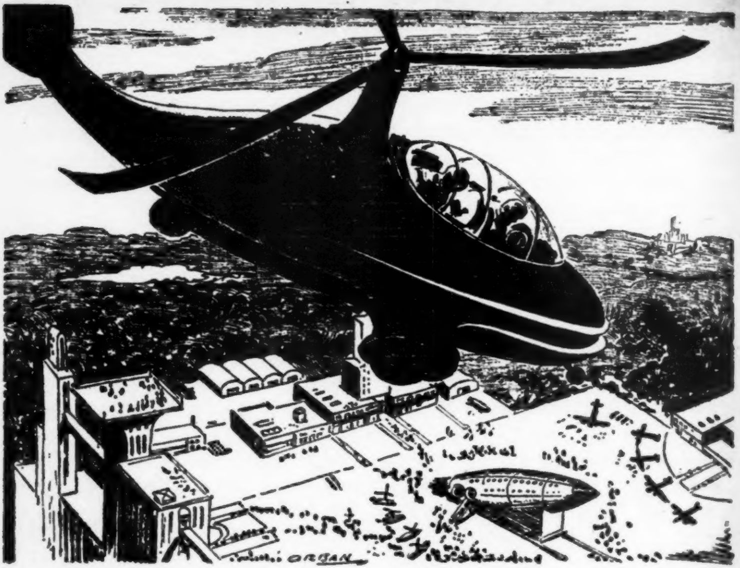
But worst of all were the regulations regarding personnel.

To begin with us, all of us were supposed to become crack shots with a variety of hand weapons. This, however, caused very little ill feeling. Some of the juniors were quite pleased, especially Hamilton. But he had always been keen on lethal devices, and hardly a trip passed without his inventing something deadly and unpleasant and passing the working models over the Board. It grieved him that he would never, except, of course, in the unlikely event of invasion from Outside, see his fiendish devices used. But he kept on turning out his little unpleasantries and reading lurid historical novels of the good old days when men were men and would kill you as soon as look at you.

The cruelest blow was the new regulation concerning the treatment of the miners from Ceres. They appeared to have a government of sorts—and this Thieves' Parliament, backed by our old friends the P.R.L., had been getting tough. Somebody in power wanted his brains examined, for it had worked. Henceforth, the convicts were to be allowed to bring along their girl friends—why shouldn't the little dears benefit by a change of scene as well as their protectors?—and their bosses, foremen, or whatever they cared to call themselves, were to be accorded the privileges of first-class passengers. Since the passengers' lounge and dining saloon were in the sealed-off portion of the ship, this entailed their eating with the officers.

This would be sure to please the Old Man. And I could foresee the commander shouting with unrestrained glee at the prospect.

But all of us, I think, were far too busy to worry overmuch about the inevitable unpleasantries of the coming trip. There was cargo to



discharge, cargo to reload, pistol training to be carried out daily and the alterations to supervise. In addition to this, I had to allocate the various cadets to their duties for the trip, either as assistants to the various officers or, in the case of seniors, to duties of their own.

Nevertheless, I had time for a heart-to-heart talk with Hamilton. I didn't like doing it, and I had been putting it off until we got out into deep space. But the extra time in port gave me no excuse for avoiding the issue.

Oh, it was just the usual fatherly chat about how the commander had taken a very poor view of his late arrival at the airport, and how we were considering having him transferred to one of the freighters with nothing in the way of pretty faces to look at the whole trip, and nothing but hairy chested miners and such in such ports as the tramps visited.

And then—for I was rather curious—I worked round to the cause of his tardy return. After all, she wasn't his usual type. How had he met her, and where?

Valerie Wayne, it appeared, was a friend of friends. Her interest in the second pilot seemed to be derived from the fact that she would shortly be making a deep-space trip herself and, naturally, was anxious to learn what it was like from the mouth of a real astronaut. And, where, I asked, did she intend going? I might have guessed it—in fact, I had guessed it—it was Ceres, on P.R.L. business. And as *Charon's* sailing had been canceled she was, obviously, the only lady passenger whom the Old Man had mentioned.

"I suppose you've told the commander?"

"No, Mr. Jones. Why should I? It's of no importance to anybody except, possibly, myself."

He was right, of course. Molly would tell me that it *was* of great importance to Cartwright, but such a flimsy excuse as a woman's intuition wouldn't make an order to Hamilton to tell the commander a lawful command.

I told him myself, just a little item of passing interest thrown into the middle of a long talk about the coming voyage. He was uninterested. Elaborately so.

At last the days of our brief reprieve were over.

The passengers came down—forty hard-faced, sullen men and women, ten guards. They weren't sullen. And there was Valerie, of course, slim and exquisite as ever, with a little group of earnest, middle-aged people to see her aboard the ship.

They were the only visitors. We missed the usual milling hordes of sightseers, but the government has always discouraged overmuch public interest in the departure of its antisocial throwouts.

There was a hitch before sailing.

The chief of the guards made a last-minute inspection of the prisoners' quarters, then hurried to the control room to see the Old Man.

"Captain," he said, "the injection system has been installed, but there are no cylinders."

There weren't. It was one of those things that everybody had left to everybody else and, in any case, the contractors, who had been flown from Port Curtis, knew more about the job of fitting out prison ships than we did. Our main concern was seeing that *Thunderbird* was spaceworthy.

Captain Wilton wanted to take her out without waiting for the cylinders of sleep smoke to be fitted, but Kayne, the chief guard, was adamant.

"I'm sorry, captain," he said. "Unless you radio right away for the stuff, I'm marching my flock of black sheep down your gangway. Then you can pile on the gravs as hard and fast as you please."

It was an awkward situation. The Old Man wasn't used to being ordered about in his own control room, and those of us who were there with him weren't used to seeing it happen. The imminent explosion was averted by the arrival of Cadet Mellish, in charge of communications for the trip, waving a flimsy.

"From London, sir!" he reported, saluting smartly.

"Thank you." The captain's face cleared as he read. "All right, commander. Run up the elements of a fresh orbit, we're delaying our sailing an hour. They've suddenly realized that they haven't supplied the beastly stuff, and are rushing it here by strato-rocket."

"There'll be no time for a test," complained Kayne. "Still, as long as the seals on the cylinder valves are unbroken, that will have to be good enough."

It was sunset when we blasted off.

I could, somehow, imagine how we would look from outside—like some enormous monolith or pillar rising sheer from the desert sand. From the control viewports we could see our enormously elongated shadow, running straight as a bar across the ephemeral hills and valleys of the sandy sea.

Cartwright, in his navigator's chair, was talking softly to himself. In spite of myself, I listened, for such an action was so unlike the man.

It was poetry, and what poetry! Heaven alone knew from what ancient book he had dug it up—for it was never the work of any of our modern apostles of Speed and Steel.

*"Sweet to ride forth at evening from the wells*
*When shadows stride gigantic 'cross the sand,*
*And softly through the twilight beat the bells*
*Along the Golden Road to Samarkand. . . ."*

He must have sensed that I was listening, for he turned to me and grinned, rather ruefully.

"This isn't going to be any Golden Journey, Peter," he said. "Don't ask me how I know, but I *do* know. Just as I knew that I should never have sailed with Sorensen on his expedition to Pluto. But I didn't back out then—and there's only myself to worry about now."

He struck a dramatic attitude.

*"For the sunset of life gives me mystical lore*
*And coming events cast their shadows before—"*

"Commander Cartwright!" The Old Man sounded displeased. "Is all ready?"

"Yes, sir."

"Then watch your chronometer, and give the order to blast on the split second."

The seconds ticked by.

At last—"Stand by!"

And softly through the twilight—no, hardly. And the warning bells filled the ship with their insistent clamor. The calm, thin face suspended over the chronometer was that of a priest performing some mystical rite of divination.

Abruptly, the clangor died in mid beat. That was my executive signal. Roaring up on her main drive, *Thunderbird* was still a pillar—a pillar of fire in the darkling sky.

Well, that was the start of a distinctly unpleasant trip.

The general atmosphere was all wrong.

All of us, I think, were acutely conscious of the cargo of human misery in our passenger quarters, and none of us liked the idea of being instrumental in their exile.

The guards, of course, and also Valerie Wayne, had cabins which had been constructed in what was, in normal times, our compartment for mails and special cargo, adjacent to the officers' accommodation. And, naturally, they had their meals in our mess room.

Think of the feeling of strained politeness at meal times! The Old Man was inclined to regard the guards as being to blame for the indignity that had been put upon his ship, and all of us, to a lesser degree, shared his opinion. Then there was Valerie Wayne, looking upon them as subhuman hunters of their own species, and they regarding her as the kind of silly trouble-making female who should have been drowned at birth.

She tried hard to be allowed to accompany Captain Wilton or the commander on daily inspection—they took it alternately, but, in this case, Kayne found himself in unexpected alliance with the ship's senior officers. Mind you, if he himself had vetoed the idea it would have been a different story. Permission would have been granted as a matter of principle. But he was wise in the ways of his fellow men, was Kayne. He had to be.

And, in his way, the man was an idealist. Perhaps as great an idealist as the starry-eyed supporters of the P.R.L., perhaps greater.

It came out one night at dinner—although the word "night," perhaps, is a purely arbitrary term when there are nothing but stars and blackness all around you for twenty-four hours out of the twenty-four.

There were six of us at the captain's table—the Old Man himself, Valerie Wayne, Cartwright, Kayne, the Surgeon, and myself. Seated a short distance away was Hamilton, casting sheep's eyes in our direction and obviously thinking that those in authority had been very unfair in monopolizing the only woman in the ship. The only woman in circulation, that is. There were plenty in the prisoners' accommodation.

Surprisingly, Kayne had been accepted almost as one of us. Even Valerie had thawed in her manner toward him. She appreciated, I think, somebody who was most definitely on the other side, against whose arguments she could bring her own to a keener edge.

Her thesis, this night, was that the whole business was deliberate degradation of the holy spirit of Man. There is so much good in the worst of us, and so much bad in the best of us—and so on. There but for the Grace of God goes—you know the kind of thing.

"But it's not so, Miss Wayne," said Kayne earnestly. "That was true in the old days, I grant you, when economic motive for crime, both legel and illegal, existed. Murder, perhaps, yes—but it is only what you might call habitual, incurable killers who get sent to Ceres. For any man or woman, notwithstanding even the most cruel penalties, could, given the right combination of circumstances, kill. And in the case of the average man or woman who has been pushed too far, it just boils down to psychological treatment for the murderer, and generous compensation to the victim's relatives.

"But there are people who are incapable of going straight. Whether economic motive exists or not, they would far sooner go to endless trouble to steal one credit than earn ten with one quarter the effort. Perhaps they do no very great harm, although, in some cases, they do. In any case—why *should* society be bothered with them? If it were left to me—*I* should practice painless . . er . . liquidation, but society is too humane.

"In the old days, they had the penal islands in mid Pacific, but it became too easy, when atomic power put round the world private transport within the reach of everybody, for the friends of the condemned to stage an occasional jail break.

"And those who escaped to resume their depradations weren't improved by their sojourn in the little Paradises that these islands, in actual fact, were. Paradises, that is, from the climatic viewpoint —but the average crook resents being dumped into the middle of a community of his own species, where others can, and will, do unto him as he has been doing to the decent citizen. On his return to the world, his one burning desire was to get his own back on society.

"Interplanetary travel, of course, solved the problem.

"Ceres was taken, and transformed into a little world with every comfort that the hand and brain of Man could devise. Surface life, of course, is impossible, but the labyrinth of caverns beneath the surface have conditioned air, fertile fields, gardens, sunlight. The power plant is entirely self-operating, and is serviced once every ten years by technicians from Earth. Should it fail, the reserve unit will at once take over.

"It is, I tell you, infinitely preferable to the deserts of Mars or the swamps of Venus."

"It is hell!" said the girl.

"Yes, it is. Because there you see, in concentrated form, the evil wrought by the essentially bad men and women. They are like a vile ferment, turning the good things of life sour.

"You know," he said slowly, "I don't like this job. I went into it, I guess, because as a kid I'd stuffed myself full of detective stories. And the vocational tests must have indicated a certain aptitude. And then I found that there was little romance about it . . . it was just sordid.

"But—after all these years the world has been cleaned up and made a fit place for the decent man and woman. And somebody, I guess, has got to sweep up the dirt that still persists in gathering in dark corners."

Valerie appealed to the surgeon.

"But, Dr. Donovan, couldn't the same result be achieved by negative eugenics?"

"No. In all of us, the good and the bad blood is so mixed. It is liable to come out at any time. Of course, anybody found to be an incurable and who has had his two chances is, as a matter of routine, sterilized before being shipped to—"

"I know that. I should. Anyhow, that is the worst part of it —a world without children."

"Now you *are* being foolishly sentimental. Just imagine the results of a world full of criminals, with no other occupations but crime and family life. I don't deny that these said criminals might be ideal parents—but, apart from questions of heredity, the children would, inevitably, acquire the same warped code of ethics as their parents."

"Couldn't *they* be transferred to Earth?" somebody asked.

"I'm no sentimentalist," averred the guard, "but that would be the very acme of cruelty."

"But suppose," persisted the girl, "that somebody is shipped to Ceres and then found innocent. What then?"

"You should know the answer to that, Miss Wayne, although I have noticed that the P.R.L. has an uncanny genius for ignoring any of the good points of our penal system.

"This sterilization is not irrevocable, although it's not done by surgical means. "It's all a question of radiations and frequencies, I think, although the doctor, here, probably knows more about it than me."

"I don't," said Donovan. "The whole business is a closely guarded secret."

"Oh, well, you'll just have to take my word for it.

"In the unlikely event of anybody being returned from Ceres, he or she will be unsterilized and will receive a handsome compensation from the government. But it's never happened yet. You can take it from me that everybody there is guilty."

"Perhaps. But—"

Well, that's a sample of what we got at every meal.

It was a change from our own shop, and if Kayne and Valerie Wayne didn't mind talking theirs, it was O.K. by us.

The commander never joined in the conversation.

That's why I was surprised when Hamilton told me that Valerie had dropped him like a hot penny. I asked him, half in jest, how his love affair was progressing when he relieved me one night in control.

"It's not," he said. "I'd never have thought that a girl like that would fall for a few more inches of gold braid."

"Rubbish. I know it's not me, and it most certainly isn't the Old Man—"

"No. It's Cartwright."

"What? They hate each other like poison."

"Do they? I see them each night in the lounge when I come off watch. Very earnest conversation. I did try to join in once or twice, but they made it very clear that I was one of life's little redundancies.

I just give them a very frigid salute in passing, now, and go straight to my room."

"But Cartwright, of all people. I'd have sworn that he'd never—"

"No, it's not that. I'd be willing to stake my bottom dollar that it's all very virtuous. The pair of 'em are too idealistic." He paused. "That's the trouble. Each is trying, most earnestly, to convert the other. They'll almost certainly get spliced when we get back—possibly by the Old Man before this trip is out—and lead a most dialectical married life."

"I'm sorry, James."

"You needn't be. There are more things in life than women, Number One. And, after all, she was never interested in the things that I am. You should see the one I'm working on now. It's a honey. It'll still hit its target even if it misses it . . . it'll chase it, I mean—"

"Please. I'm not in the mood for weapons. It's beggars like you that made wars in the past—turning out all this lethal gadgetry, and then sulking and raising Cain in general till they had a chance to try it out."

Hamilton wanted to argue, but I cut him short. After all, it was his watch, and I failed to see why I should keep him company while he rode his hobby horse on flights of bloodthirsty imagination. When I left him he had already seized a pencil and begun to decorate the scratch pad with sketches of what looked like a sort of torpedo or something.

I didn't intend to eavesdrop on the commander and Valerie Wayne.

After dinner I went to my cabin, but was asked to have a few beers with Kayne and his men. I accepted, and we sat in the lounge—with the tables rigged and the easy chairs stowed away it was the mess room—drinking and talking.

Beer always makes me drowsy. I must have fallen asleep.

Something woke me—I don't know what—and I wondered, for a few seconds, where I was. The stewards had turned out most of the lights, and my chair must have been in deep shadow. Just behind it was a sofa, and from this came voices.

"You see, Valerie, I just can't raise any sympathy for the incurable criminal. Why they do the things they do I can't say, it may be just love of doing wrong, it may be a sort of warped lust for power, it may be both. But I'm bitter. The people who did what they did to Jane got off far too lightly—after all, Ceres is no punishment for the kind of criminal who will, inevitably, come out on top in their hierarchy of evil.

"I hadn't been married to Jane long. I don't think that any of my shipmates knew that I was married—for she never came down to any of the spaceports. She hated ships, anyhow. Perhaps she sensed that they were rivals for my affections—perhaps she was right.

"Well, I got the chance to sail with Storensen as chief pilot—it was on his expedition to Pluto. Of course, I went. Jane took it badly—she was convinced, somehow, that no good would come of it. Funnily enough, I had the same idea at the back of my mind, but I refused to pay any attention to it.

"Jane was an actress and, naturally, most of her friends were theatrical people. I'd met them all, at various times, and I liked them. I must have been a poor judge of human nature, for one or two of them were—vile.

"It was one of her friends that started her on drugs. I don't know how—probably told her that it would soothe her nerves when she was so obviously worrying about me. And she had something to worry about, too. For our radio had failed—a complete blowout, and we hadn't sufficient spares to rebuild the transmitter. And so there was no news from Storensen.

"Inevitably, the usual fools started rumors. Gone with all hands—the usual kind of thing. And Jane took these to heart. Somehow, the supply of drugs must have been cut off—and in a fit of depression the poor kid just walked into the sea. Anyhow, that was the story they told me when I got back.

"They got the woman responsible. It was her second offense, and she was certified as incurable. But, her name . . . I remember, now— It was—Audrey Wayne!"

"Yes, John. My twin sister. That probably accounts for your thinking we had met before that day at the airport. But she wasn't bad, John. Please believe me. She was weak, yes, and as much a victim as poor Jane—"

"I'm sorry, Valerie. The tests don't lie. If they said she was bad, then she was bad. And Ceres is too good for her."

"John! Remember, she is my sister."

Bitterly, Cartwright said something about birds of a feather. Then—

"Good night, Commander Cartwright. Thank you for a *very* pleasant evening."

I hadn't meant to hear all this, and I resolved that no word of what I had heard would ever be divulged. Yet, I wasn't exactly sorry. I suppose I'm just naturally nosy, and there were a few things that had always puzzled me about the commander. Molly would be— No, not a word to her, even. In the meantime I had better wait till the coast was clear and then retire to my virtuous couch.

I heard Cartwright go to the little locker in which cold beer, mineral waters and such were kept. Suddenly, I looked up to find him standing over me with a bottle in each hand.

"You were listening—" he said.

"Unfortunately, yes. I was asleep in this chair, and must have woke up when one of you raised your voice. And I thought it would be less embarrassing for all concerned if I just lay doggo for a while. I'm sorry."

"It's just as well, perhaps," said the commander. "I want somebody to drink with. I have never believed in drinking alone."

"Then you'll not be drinking long—*I've* got a watch to keep. But one bottle won't hurt me."

Oh, we had the one bottle apiece, and then another, and then some more. It did Cartwright good to talk, I guess. He told me about his wife, Jane, and what he had been told about her tragic end. And he talked of Valerie. There wasn't much doubt about it, he was in love again, and seemed to think that it was mutual.

"But it's this Penal Reform League!" he complained. "This isn't the first quarrel we've had, and it's always been on the same lines. Tonight was the first time that I told her anything of my own past—and it would have to be her own sister involved in the tragic mess. The girl's an idealist—"

"So are you," I murmured.

"What was that? Rubbish. The girl's an idealist, and I like her all the more for it. But I wish she'd expend her idealism on a worthier cause than the well-being of a gang of moral lepers. But that's the trouble with crusading women—so often the personal issues involved overcloud everything else. If only—"

"If only the pair of you could find some common cause to fight for!" I said. "Well, you may, some day. I hope you do. But I have some pressing arrears of sleep to make up."

It was the next day, I think, that Hamilton showed me his latest invention. I can't be sure, for in deep space a day is a meaningless term—it can be two watches of four hours each and two spells of eight hours off, it can be three meals with a few extras, only to the navigator has it any significance. And to him it is merely once around the dial of a twenty-hour hour chronometer.

But I had been putting off and putting off the grim experience. I don't like weapons. But Hamilton was insistent, and to deny him any further would have been like refusing to view a newborn child and give a flattering opinion of its looks and abilities to the brat's mother. Yes, mother, for there was nothing fatherly in the second pilot's devotion to the children of his brilliant, but misguided, brain. No. He was, one might say, fiercely maternal.

So Hamilton led me down the long series of companionways and —latterly—metal ladders to the workshop, which was right aft, adjoining the engine room.

"Look!" he said, proudly displaying a sort of plastic cylinder about four feet long and, maybe, a foot in diameter at its thickest part.

"It's wonderful, Jimmie, but what does it do?"

"It's a torpedo. Here are the jets, one driver and four auxiliaries spaced equally around it. The fuel —a thin thread of metal with all the magnitrons knocked out—at least, nearly all. With all gone it would be too unstable for fuel.

The charge goes in here"—he pointed to the extreme end of the thing's nose—"just a block of any unstable element. The shock of impact will be enough to set it off."

I backed away hastily.

"Is the thing loaded?"

"Of course not. In actual practice you'd have a ship fitted with a special converter as we have here, and just knock the magnitrons out of anything that came handy and load the torpedoes before firing."

"But there's nothing new here. You're using atomic fuel, of course, and atomic explosive but, in essentials, it's just the same as the affairs they used at sea in the twentieth century."

"Perhaps. But here we are, embarked, shall we say, on a career of piracy"—we both laughed—"and along comes some fat-bellied merchantman. We signal her to heave to, threaten to slip a torpedo into her guts if she doesn't. She doesn't. She sees our projectiles coming, swings to avoid them and then runs like hell, literally squealing with fear over her radio.

"But she won't. Not if the bold pirate is using one of Hamilton's patent magnetic torpedoes. Look!"

With deft fingers he opened up an inspection plate at the thing's for'ard end.

"See this? It's a needle, free to move in three dimensions. You know as well as I do that a rocket in flight takes a magnetic field along with her. You've got all the free magnitrons out of the fuel rushing around, and even if the batteries are working efficiently to stow them nicely red to blue and blue to red, there's always some wastage. And you know the result, a whacking great blue pole aft and a red one for'ard.

"Now, suppose that the torpedo is going to miss above the target, what happens? This needle is deflected down, the rear end rises and bridges these two contacts, and the upper auxiliary jet cuts loose and steers the whole contraption down until she is once more running true and level. Do you get the idea?"

"I think so. But it'll be something of a boomerang. Law of Inverse Squares, you know. When you loose her off, the magnetic influence of your own ship will be predominant and she'll just come back and hit you where it'll do the most harm."

"I've thought of that. One solution is a little device timed to release the needle when the torpedo is well inside the other ship's fields of force."

"But suppose she knows the nature of the weapon and cuts her drive?"

"Well, even then there will be sufficient transient magnetism hanging around to make the control function—as well as a fair dollop of permanent. To be on the safe side, the attacking ship should turn everything off the moment the torpedo is launched."

Then I saw the fly in the ointment. A fly? It was about the size of an albatross.

"All right," I said. "Now suppose that this atomic nemesis of yours is just going to miss the bows of the target ship. I suppose that the needle inside the controlling mechanism has its own red pole for'ard—so what happens? Like repels like, or so I was always taught at school. It is deflected *away* from the objective, and the torpedo will never make contact."

Hamilton grinned—that superior grin of his that was, at times, so infuriating, especially to those placed in authority over him.

"I never said that the needle was a permanent magnet, did I? Well, it's not. It's made of Mumetal, which, as you know, is notorious for its permeability. If it happens to be in the vicinity of the red pole you were talking about—then the end of the needle nearest said red pole immediately becomes a quite strong little blue pole. What the answer is in dynes I don't know, I've never bothered to work it out. But take it from me, the little beast will assume the correct polarity every time. Satisfied?

"And before you think of it yourself, I haven't installed a little converter in the torpedo for two reasons. Firstly, it would be hard, though not impossible, to make one of that size. Secondly, the consequent electromagnetic disturbances would throw the whole mechanism completely out of control. By using fuel already practically stripped of its magnitrons I reduce such errors to an absolute minimum.

"Take it from me, if you see one of Hamilton's Horrors coming for you, there's no escape!"

So the long voyage wore on.

Meaningless, artificial days and nights, the comforting routine of watch on deck and watch below, eating, drinking, sleeping, card playing.

Hamilton appeared to have got over his calf love for the P.R.L. secretary, and she and Cartwright made it up again and then fought like wildcats at regular intervals.

And we reached that uncharted, variable point in space when the navigator gave the order to turn her over, and we experienced a few seconds' dizziness till the drivers took hold again and deceleration commenced.

The prisoners?

Oh, you become callous about these things. Most of us never gave 'em a thought. Valerie Wayne at last wheedled the consent of the brass hats to her coming with them on the daily tour of inspection—and she was shaken. It is one thing to feel an overwhelming sympathy for the members of any one class of society in the abstract—it's another story when you come up against them in the raw.

We weren't surprised when the girl retired to her bathroom immediately on returning forward, and still less surprised when we heard the shower running for a considerable period.

Then, at last, it was Landing Stations.

Below us flashed the red beacon of Port Capone, situated almost exactly on the North Pole of the prison planetoid.

Carefully, gingerly, I set her down.

There was a slight shock as we grounded.

Then we sat in the control room, looking with some curiosity at the barren, jagged landscape with its curiously circumscribed horizon.

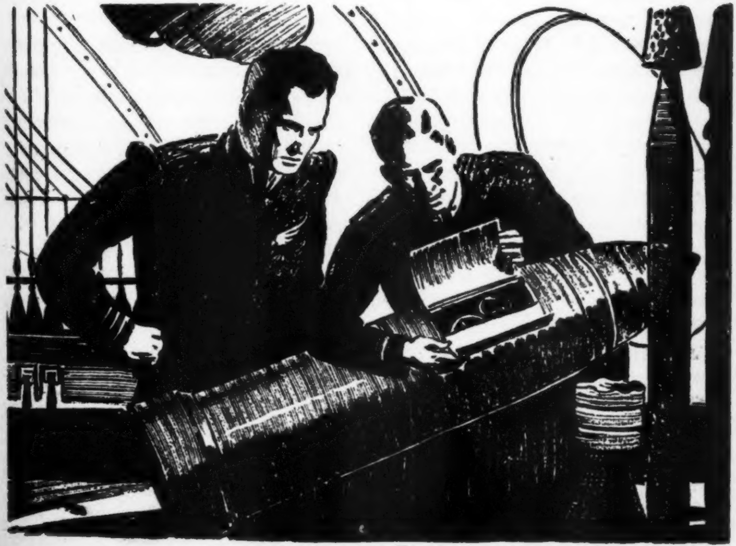
A few hundred yards from *Thunderbird* a circular door slid open in the side of a low cliff. We could see artificial lights gleaming inside. Then, grotesque in the thin, harsh sunlight, a dozen or so spacesuited figures emerged. The reception committee.

Kayne and his men, not without a certain amount of bullying, hustled their charges into spacesuits. In batches of ten they were assembled in the starboard air lock, and then marched down the retractable gangway. Once ashore, they were lined up in rough formation by the colonists who had come to meet us. These, I saw, carried metal-shod staffs, and even their clumsy, all enveloping clothing could not conceal a certain air of authority, of almost military briskness.

I was on duty in the air lock with Parker, one of Kayne's underlings.

"I thought you had no guards on Ceres," I said.

"We haven't. This is all Mr.



Ruddy Broderick's doing."

"Broderick? Who's he?"

Parker laughed, a nasty tinny sound in the helmet phones.

"He's plenty. One of *the* Brodericks, just the one that got found out. I hope we have the pleasure of bringing the rest of the clan here."

"What's wrong with them?" I asked indignantly. "I voted Latter Day Democrat myself last election. It's a pity they didn't get in."

"That's what you say, Mr. Jones. *Hey! Step lively there, sister! They ain't going to leave this ship planted here forever as a monument to your lost virtue!* No, Mr. Jones, you space officers don't know much about politics. You lose touch. Though, come to that, most people ashore don't know much, either."

"Well," I said, "I may be wrong, but it seems to me that the big strides made by the L.D.D.s in every country show that they must have their points."

"Sure, they have their points, on paper. Do you know—though I don't suppose you do—the Kremlin is even thinking of going back to their old one-party system—even if it means pulling out of the Federation. And you know what *that* means. *Step lively there, you bum,* WE'VE *had enough of your low company. Somebody else can try it and see if they like it!*

"Yes," he continued, "you can learn plenty about politics in this job if you keep your eyes and ears open. And you'd be surprised if I told you how much connection there is between politics and crime. Ninety percent of this bunch are L.D.D.s."

"Rubbish!"

"Sure, sure. You know best, mister. Rule No. 17—never argue with ship's officers. But if Russia has the guts to throw out the L.D.D.s, I'm going there before they swamp the rest of the world. Better the dictatorship of the proletariat than being bossed by the Brodericks!"

And he started whistling, a thing that one should never do when one is wearing a spacesuit complete with helmet set.

I was no longer on duty in the air lock when the labor boarded, but I was in the lounge when William Broderick paid his respects to the captain.

He had shed his spacesuit immediately on boarding, and confronted us in all his tarnished finery. The mere fact that it was tarnished added to the man's piratical aspect, as did the sword hanging from a gold-embroidered belt. But it was one of the people with him who, at first, drew all our attention. It was—almost—Valerie Wayne. The same elegance was there, but subtly meretricious. The eyes were the same—but lacked the clear candor. The mouth was—*wrong.* Like her sister, Audrey Wayne was an aristocrat. A decadent one.

Valerie paled.

"Why," she gasped. "Audrey! *"Audrey!"*

"If it isn't little Valerie!" said

the other. "What have *you* done?"

The P.R.L. secretary ignored her twin's flippancy and walked slowly forward, almost like one in a dream.

"Audrey!" she said again.

We could see tears glistening in her eyes.

There was a little, uncomfortable silence whilst the sisters ignored everything outside the little world of each other's arms.

Plainly displeased, Broderick fidgeted. A frown darkened his coarsely handsome, blue-jowled face.

At last—"Pardon my interrupting this touching reunion," he said, "but allow me to introduce myself. I, captain, am King William the First of Ceres. *We*"—this time he had it right—"have decided to accompany our loyal subjects on this expedition to see for ourselves their conditions of labor. These" —he waved his hand—"are the ladies and gentlemen of my . . . I mean *our* . . . court."

Captain Wilton looked uncomfortable. How was he supposed to receive this self-styled monarch?

Kayne took the matter out of his hands.

"You," he said, "are William Broderick. And you are wearing a weapon, which is against all the regulations. This, of course, will be reported to the proper authorities. Hand it over, please."

He waited, then drew his pistol. It wasn't one of the five-hundred shot affairs that fired nice little needles coated with an anaesthetic, nonlethal compound. No. It was an old-fashioned gun firing a slug almost a half inch in diameter.

Broderick looked sullen.

"Hand that toothpick over!"

The King of Ceres shrugged, then grinned.

"You never did like me, Kayne, did you?" he said. "Perhaps I shall be in a position, one day, to deal effectively with people *I* don't like. Here."

With an almost courtly air he presented the weapon, hilt first to the guard. He looked around.

"Is this the lounge? Not bad."

"You will feed here, Broderick, you and your staff, but that's all!"

"But the new regulations—"

"Say that the leading hands of the labor shall mess with the officers. They don't say that they shall enjoy *all* the amenities provided for the ship's staff. Three times a day—provided, of course, that either Captain Wilton or Commander Cartwright comes along to open the door for you—you and your entourage will be released to inflict your company on us at table. And, three times a day you will be returned to your proper place—under escort."

Broderick was about to protest, then Parker created a diversion by coming in to report that all the labor —thirty men and five women—was aboard.

"Thank you, Parker. Have I your permission, captain? Good. Boys, escort the King and his Court to the Palace!"

That was the last we saw of King William and his entourage till dinner.

Meanwhile, the orbit had been plotted that would take us to 596, that lonely, jagged little world lying a little North of the Plane of the Ecliptic, and out of the main stream of the asteroids. Nobody was on the landing field to see us blast off, the last, spacesuited figure had scuttled into the now closed door to the interior hours before our sailing time.

Once again we were all at stations, once again the warning bells shrilled briefly, and then we were swinging out and away for the indium mines.

And then we had to face the ordeal of dinner with the "King" and his loyal subjects. We regretted, deeply, that we did not rank high enough to follow the Old Man's example and have our food sent to our rooms. And yet—it promised to be an experience.

Strangely enough, Cartwright made no demur when it was proposed that Broderick and Audrey Wayne sit at the Seniors' table. He realized, of course, that Valerie would want to see as much as possible of her twin, and, perhaps, he may have hoped that close contact with the criminal classes, as typified by King William I, would knock some of the nonsense out of her head.

Kayne didn't mind, as long as he was able to keep an eye on his precious charges he had no real worries. Donovan welcomed the opportunity to add to his knowledge of abnormal psychology. And I, being in a minority of one deemed it politic to make just one protest as a matter of principle, and then let nature take its course.

It was a funny meal.

One thing was clear from the outset — Audrey was dangerous. Broderick was, too, but he wasn't in the same class. He would achieve his ends with any tools or weapons that came to hand, and with a fine disregard for any code of law or ethics. But the girl would achieve ends as great, if not greater, with weapons far less obvious. It seemed indeed strange that her charm had not cheated the law of its victim. But, probably, sojourn on Ceres had sharpened her natural weapons to an edge of almost fantastic keenness.

It was the waterworks that she turned on first.

With a break in her voice she rhapsodized about how it felt to be free once more—even if it were only freedom on the end of a chain. Her voice—the voice of a consummate actress—held all the yearning in the world—all the worlds. At the other tables the junior officers and the shiftyeyed toughs turned their attention from the faded blondes of William's court to gaze—with a certain wistful wonder—at the central table.

"To travel," she said, "that is the only life for the superior person. The Golden Journey.

"How does it go?

*"Thy merchants chase the morning down*
*the seas—*
*But now they chase the very stars*
*across the sky."*

"Hassan — " said Cartwright slowly. "You know it?"

"Why, yes. I played in it. No," she said, before he could ask the question that was trembling on his lips. "Not Pervaneh. Not even Yasmin, though God knows I'm well enough qualified—"

"Audrey!"

Valerie's voice was sharp with distress.

"Nothing like being honest, my dear.

"No, Commander, I was just one of the dancing girls. *You* know—

*"We are dark, but as the twilight,*
*Shooting all the sky with fire—"*

Again she paused, and regarded her sister steadily over the rim of her glass.

"If you want a Pervaneh, commander, there she is. The perfect little idealist. Always ready and willing to sacrifice her own, or anybody else's life on a matter of principle. I don't know whether to feel sorry for her or," her voice fell to almost a whisper, "to envy her.

"But 'Hassan,' commander, there is the play of plays. That last scene —Gate of the Moon, Baghdad, blazing moonlight. Can't you see it? The fantastic buildings, the guards, the merchants, and—the pilgrims.

"And the philosophy of it all, philosophy as old as Transport itself.

*"We travel not for trafficking alone—*
*By hotter winds our fiery hearts are fanned,*
*For lust of knowing what should not be known*
*We take the Golden Road to Samarkand."*

★★★★★★★★★★★★★★★★★★★★★★★★★

*HE GOT THE PURPLE HEART . . .*

WILL A BOND PROVE TOO COSTLY FOR YOU?

It's left to your own conscience, because that's the kind of country we are. Somewhere else in the world, the money needed to carry on the war would be gotten through added taxes, compulsory savings. But not here. Because we're still free . . . and it's still up to you—and no one else—to decide whether or not your country, or your boy, is worth another bond.

BUY IT NOW!
THE WORLD'S
BEST INVESTMENT!

**WAR BONDS**

★★★★★★★★★★★★★★★★★★★★★★★★★

She paused again.

"That applies to you, commander, doesn't it? It applies to all of you—" She swung a little in her chair, swept the unmasked battery of her glowing eyes over what had become her audience.

*Did they, I wonder, linger ever so lightly on Hamilton's rapt face? Had she, already, chosen the tool with which she would work?*

But Audrey Wayne swung back into Flecker's deathless lines.

*"We are the pilgrims, master; we shall go*
*Always a little farther—it may be*
*Across that last, blue mountain rimmed with snow,*
*Across that angry, or that shimmering sea.*

*White on a throne, or lonely in a cave,*
*There lives a prophet who will understand*
*Why men were born—but surely we are brave*
*Who take the Golden Road to Samarkand—"*

There was, for a little, silence. Nobody quite applauded, but I think that if anybody had started it would have burst the bulkheads.

Audrey Wayne filled her glass.

"The Golden Journey, commander," she cried. "The Golden Journey!"

*Did her eyes slither past Cartwright's to meet those of the second pilot?*

"The Golden Journey," replied the commander, his voice curiously flat and toneless. Then— "You will all excuse me, won't you? I have to check our orbit. Thank you for your company—and the entertainment Miss Wayne. It has indeed been an interesting experience to dine with my wife's murderer—"

*"John!"* cried Valerie, unheeded.

"Let me know, Mr. Kayne, when you are returning these birds of prey to their nests."

And he was gone.

"The Board shall hear of this!" blustered Broderick, his hand where the hilt of his sword had been. "If these be officers and gentlemen—"

"Please." It was Audrey Wayne, her voice the voice of a rather frightened little girl. "You should have told me, Valerie. I had forgotten. One forgets so much. And *you,*" there was a flash of her old manner, "wouldn't know what a gentleman is. But then, of course, kings don't have to worry about the little niceties the same as us commoners—"

Her voice broke, and she started to sob. In a flash, her sister was by her chair, comforting arms around her.

It was all very embarrassing. I was going to help Cartwright check the orbit and leave Donovan—after all, it was more in his line than mine—to pour oil on the troubled waters. But I was too late. Donovan didn't bother to trump up any excuses—he just left. And one of the seniors—and I was the only one left—had to stay in the saloon.

"Mr. Kayne," said Valerie, "I know this is against your absurd regulations—but may I take my sister to my room? Thanks to Commander Cartwright's inexcusable conduct she is in no fit condition either to stay here or to be returned to her own quarters."

The way she said it, it was more of an order than a request.

Without waiting for the guard's consent, she rose to her feet, supporting her sister with her right arm. And so they stood there for a moment or so, the tall, slim figure in somber black and the other—so like and yet so unlike—in form-revealing red.

"I'm all right now, Val. Really."

The voice of a child trying to be brave.

"No. Come with me."

If Broderick wished to ape royalty, he couldn't do better than take a few lessons from Miss Valerie Wayne.

After Cartwright's exhibition of how to win friends and influence people, the rest of the evening was hardly a success. Kayne was reluctant to go to Valerie's room and tell her that it was time for her sister to be returned to her own quarters, so Broderick and his court enjoyed an extra hour or so of relative freedoom. It wasn't much use to them. The people in the lounge—for the collapsible tables had been stowed away by this time—just split up into three distinct groups—ship's officers, guards and criminals. The juniors, I know, would gladly have improved their acquaintanceship with King William's ladies—but Kayne and myself took good care that they didn't.

At last—"Orders are orders," said Kayne, "and she's not going to stop in this part of the ship. I don't give a care if her sister *is* Secretary of the P.R.L. I don't give a care if she's —" He paused for the right word, couldn't find it, and continued— "Anyhow, Mr. Jones, I'd be pleased if you'd come along with me."

"All right. Duty is duty."

So we went along the short alleyway, and Kayne rapped on Valerie's door.

"Miss Wayne!" he called.

"Yes. Who is it?"

"Me. Kayne."

The door opened, and the two girls came out.

"I'm awfully sorry, Miss Wayne, but—"

"I quite understand. The rules and regulations by which you order your life make no allowances for the finer feelings. You will raise no objections, I take it, if I accompany my sister as far as the door to the cells?"

"No, no. Of course not."

Kayne was pleased at getting off so lightly.

The girl pressed her advantage.

"And I take it that it will be quite in order if my sister comes to my room for half an hour or so after every meal It is many years since we saw each other last, and we have many intimate matters to discuss."

This time Kayne hesitated ever so slightly, looked to me as though for support. I carefully avoided his glance.

"Of course," he said. "But, mind, no more than half an hour."

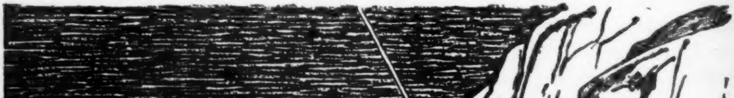
"We would not dream of trespassing overmuch on your generosity. Come, Audrey, let us go with Mr. Kayne. We have already disturbed the routine of this prison ship sufficiently for one day."

When we returned to the lounge, Cartwright was already there. Somebody had sent for him so that he could officiate at the acoustic lock. He carefully refrained from looking at the girls. Not that it mattered, as they looked right through him.

The prisoners were marshaled, then, and the little procession made its way through alleyways and down companionways to the prison quarters. Broderick and his staff, in all their tawdry finery, went first, then the guards in their olive drab, their paralyzer pistols at the ready. A little behind them walked the sisters—a tall, slim figure in black and a tall, slim figure in flaming red. They bore themselves like tragedy queens on the way to the guillotine. Kayne himself was their escort. I wondered whether he would have the guts to use his pistol if either of them started anything, Cartwright, too, would he use force? I glanced at his face as I walked at his side, but it told me nothing.

We reached the door.

The guards cleared a space around the funnel-shaped aperture into which the commander would whisper the magic word. Looking neither right nor left, Cartwright paced slowly forward. He bent his head slightly, for he was taller than average, and then, his lips almost touching the lips of the funnel, murmured something. Every ear



among the prisoners, at least, must have been strained to catch what it was. Silently, the ponderous door swung open.

"Good-bye for now, my dear," cried Valerie Wayne. "I'll see you again tomorrow!"

Briefly, the sisters embraced, and then the slim figure in the flaming gown passed into what Kayne, but a short while before, had referred to as the Palace. And, from her bearing, it could have been one.

"All right, commander," said Kayne.

The door shut. The guards holstered their pistols.

"Come and have a drink, Peter," said Cartwright. "And you, Kayne. I think we've earned it!"

A low, malicious laugh startled us.

We turned to look at the tall, slim figure in somber black leaning against the bulkhead.

"Yes, commander, you certainly have!" said the girl. "And I wish that I had the job of naming your poison!"

Nobody was surprised when Valerie Wayne threw over Cartwright in favor of young Hamilton. Not that anybody expected anything serious to develop from the flirtation—not as far as the girl was concerned, anyhow. But everybody was of the opinion that, this time, the commander had definitely put himself out of the running.

It all seems very trivial, no doubt, but remember that a ship is like a small village and that the average spaceman is, I think, without peer as a gossip monger. None of it malicious of course, but merely a means of lightening the tedium of the long voyages.

But we had far more to concern us than the purely personal affairs of our shipmates.

For, out of the star-specked blackness of the Belt loomed another star, a litle red star flashing with monotonous regularity. And it flashed in code—numeral five, numeral nine, numeral six. The beacon of the indium mines.

Then came the rather ticklish job of throwing ourselves into an orbit around the little, jagged chunk of metallic ore. A landing, of course, was possible, but it would have been extremely imprudent to essay the feat in a vessel of *Thunderbird's* tonnage. The only level patches on 596—and the configuration of the terrain had not been improved by continuous blasting since the last survey—didn't appear to be much larger than a pocket handkerchief.

This contingency, however, had been provided for in the refit before sailing. The cradle in which, normally, our Number 2 boat rested had been greatly enlarged, and now carried a big tender. This would ferry the labor from the ship to the mines and would, of course, act as an ore lighter.

Broderick, of course, refused to take any interest in the work of his subjects, although the lords and gentlemen of his court shed their robes of office and appeared in the spacesuits of charge hands.

It was soon apparent that the loading was not going to be a short job. The tender had to make two trips each morning—even here, where there was neither day nor night, the new agreement between the Earth government and the colonists called for an eight-hour day—once with the explosives which had been manufactured in the auxiliary converter, and then a second trip with the labor. And then—but I could spend hours on a catalogue of the many and ingenious time wasting devices employed by the convicts.

We took it in turns operating the tender.

And after a wearing day at the controls of the little craft, it was galling to have to have to eat our evening meal in the company of the glorified foremen whose errand boys we had, in effect, become.

Cartwright no longer came into the saloon for his meals.

As I was now the senior at the table, Hamilton asked if he could make up the number. It was weak of me, perhaps, but I gave my consent. Perhaps it was because I could keep a better watch on developments between him and Valerie Wayne. Frankly, the whole business had me puzzled. No observer at our table could have told which of the twins was his inamorata. I doubted if he knew himself.

Perhaps only one man of the entire ship's company was happy. That was Captain Wilton. Leaving *Thunderbird* in the capable hands of his second in command, he would range back and forth along the Belt in one of the lifeboats, taking with him two of the cadets. He had often advanced the theory that the planet which, eons ago, had scattered its wreckage between the orbits of Mars and Jupiter had been the cradle of all life in the System. And now he was hurtling happily from one insignificant little piece of rock to the next on his endless, but so far unsuccessful, search for the merest thumbprint of animate Nature.

One evening, after dinner, I was in Cartwright's room.

"I wish they'd hurry up with the loading," complained the commander bitterly. "Kayne says that this is the slowest he's ever seen 'em."

I sympathized with his desire. The condition of weightlessness, consequent upon our being in a free fall around the indium asteroid, had long since lost the charm of novelty.

"You'd think they'd want to get away themselves," I said. "Surely even they can't like having to lash themselves to their chairs, and having every meal out of a bottle."

"Just the kind of thing that would appeal to *them,*" said the commander moodily. "If you expect to find any human emotion among that bunch of moral lepers, you're—"

The telephone from control to Cartwright's room buzzed insistently.

"Hello . . . Speaking . . . *What?*" His face paled under its tan. "Turn on the gas, man! . . . You have?"

He turned to me.

"Trouble in the prisoners' quarters. Turn on the snooper, will you?"

I went to the switch of the speaker on his bulkhead. There was one of these in control, one in the captain's room, and one in Cartwright's. Only the one in the control room was kept running continuously. At the other end of the wiring was a set of microphones distributed at secret, strategic points in the prison accommodation.

Hand over the switch, I hesitated. There was a new note in Cartwright's voice, a new expression on his face. Before they had been the voice and face of a senior officer worried, but not too badly, over the safety of his ship. I had always thought that *Thunderbird* came first, always would come first, in his affections. I saw that I was mistaken.

*"She's* down there? . . . But how? . . . Oh . . . And *you've* known about this all the time . . . I'll break you for this, Hamilton . . . Raise as many people as you can. Arm them. And get down to that Hell's kitchen as quick as you can!" Then, as an afterthought, "Leave one of the cadets in control."

By this time the speaker was switched on.

From it came gusts of coarse laughter, angry voices.

We heard Broderick say—"You little spy. Come here snooping for that supercilious boy friend of yours, I suppose? What shall we do with her, boys?"

"What does it matter, your majesty?" roared somebody. "The worst they can do to *us* is sentence us to life on Ceres!"

Then another voice. Valerie's. "You fool! Can't you see that I've come down here to help you? Get hold of Audrey—she'll tell you!"

"Take this!" Cartwright had fished two pistols from a drawer, one of which he kept himself. "And hurry!"

The most nightmarish experience possible in waking life is, I think, trying to get somewhere in a hurry inside a spaceship in a free fall. A spaceman has to be reasonably adept at this art but—even so—there is never sufficient practice to attain proficiency. And when there's a very real sense of urgency it is like a child's toy balloon being chased by somebody with a pin.

We met the others in the lounge—Hamilton, Donovan, the third pilot, the engineer, three of the cadets.

"The guards, sir," gasped Hamilton, swimming towards us. They're drunk, I think. We can't wake them."

Kayne and his men were lolling in their chairs. Floating in their vicinity, like a kind of alcoholic aura, were a dozen or so empty drinking bottles.

"Never mind them. I'll break them—too!"

The second pilot recoiled from the mask of fury turned upon him by the commander. I couldn't help noticing that he brought up the rear of the little procession that was floating with grotesque attempts at speed, down to the prison quarters.

At last—and it seemed an age—we reached the door.

It's funny how, even on the most dreadful occasions, one's mind will notice the little things. I had always wondered what the word was. Cartwright threw secrecy to the winds. "Open, Sesame!" he almost shouted into the funnel of the lock. "Open, Sesame!"

Our guns were ready, we expected some opposition.

But there was none.

Here, in what had been pasenger quarters, there were guide rails along the alleyway. Led by the commander, we began to pull ourselves along with relative rapidity.

Then a voice, Valerie's voice, made me turn.

"Jim! Jim! What are they doing to my sister? What are they doing to Audrey?"

"Sorry, my dear," I heard Hamilton say. He raised his pistol and shot the girl. Without releasing his pressure on the trigger, he swung the gun, and we heard the hissing of its continuous discharge as a hail of the little, anaesthetic needles swept along the alleyway. I felt a brief, pricking sensation as the tiny missiles found face, and neck, and hands I tried to raise my own pistol to return Hamilton's fire, but it was too much trouble. Everythiing was too much trouble.

"Mr. J. Hamilton . . ." I was mumbling to myself. "J for Judas . . . Laugh . . . It's funny . . . very —"

We had time to dope things out aboard the tender.

Yes, that's where we found ourselves—all of us, guards and crew. All but the commander, Valerie and, of course, Hamilton. And we tried hard to think of soft words to turn away Captain Wilton's righteous wrath when he returned from his bug-hunting expedition in No. 2 Boat. We could have got in contact by radio, but ours, needless to say, had been effectively sabotaged. So, we found on his return, was the Old Man's. I had misjudged friend Hamilton in more ways than one. I had taken his enthusiastic, personal checking of the captain's radio equipment as a manifestation of the old we'll all-come-back-next-trip-sir spirit.

But we weren't too badly off—yet.

We had air, and food, and water.

We had enough fuel to keep us going with heat and light for a considerable time—we had enough, in fact, to blast us off from the barren surface of 596. But we hadn't enough to take us anywhere. Except Ceres. And after our experience of the conduct of the aristocracy of that pleasant little world, we weren't exactly anxious to rub shoulders with its proletariat.

No, all we could do was sit tight and await the coming of some kind of rescue ship. We knew that when *Thunderbird* was reported missing, as she surely would be, the indium asteroid would be the obvious place to commence a search.

The worst of it was that the tender had been fitted with what was, in effect, only a large scale lifeboat converter. Had it boasted one of the pattern supplied to the big ships, we could have fed literally *anything* into it. But, at that time, the rocket motors of small craft were dependent for fuel on the converters of their parent ships.

There was one hope—that when the Old Man returned we should be able to pool resources and scrape up enough fuel to send the lifeboat clear to Mars. But he, as had been his practice ever since he started his one-man survey of the Belt, returned with the merest sliver of unstable iron in his magazine.

The only thing that he had plenty of was bad language.

When the tumult and the shouting had died he held a conference. Regarding our present circumstances, the general outcome of it all was as I have outlined it above. There was nothing to do but sit down and wait for help. Regarding what had happened in the past—well, all of us proved remarkably adept at putting two and two together to make at least four—and this when the problem in human mathematics had worked itself out long since.

It was plain to us now that the twins had used the daily sessions in Valerie's room to change their clothing. This would have been obvious—but for one thing. It was impossible to associate Valerie Wayne with anything of a criminal character. Even now, excuses in plenty were forthcoming to excuse her conduct. As Secretary of the P.R.L. she wished, naturally, to live among the convicts as one of themselves. It was the only way to learn anything about them. It never occurred to the little fool that she was

*TRIP INTO*
**TERROR**

On the train Doc Savage stole the girl's purse.

Then later, in the hotel in Miami, the police found the long, fat man murdered—with the evidence pointing at Doc!

So Doc made the terror-ridden trip to KING JOE CAY, the remote Bahamas fortress of a fabulous lady internationalist. What was behind that strange adventure? Find out in the July issue of

**DOC SAVAGE**

**AT ALL NEWSSTANDS**

playing with the worst kind of fire, and that whilst she was earnestly engaged in taking mental notes, her precious twin had marked down her prey, and was doing her best to seduce him from the line of duty.

But what had Hamilton to gain? Plenty.

First of all, Audrey Wayne herself. And then, assuming that, as we thought at the time, Broderick intended to embark on a career of piracy, as the only astronaut in the party he would attain considerable rank and influence. Lastly—and this, knowing the man, is not to be dismissed lightly—he would have an unparalleled opportunity of playing with his dangerous toys.

Our conclusions were wrong in some things, but, as we were to discover later, we had all been remarkably wise.

After the event.

John Cartwright's awakening wasn't such a leisurely affair as ours had been.

What brought him around was the fact that somebody was methodically slapping his face—a crude but effective means of restoring the victims of the paralyzer pistol to full consciousness.

He put up his hand to ward off the blows. That is—he tried to. It was then that he discovered that he was lashed hand and foot to a chair.

No, he didn't say—"Where am I?"

On opening his eyes he saw that he was in the captain's room. And that sense possessed by all spacemen told him at once that *Thunderbird* was no longer at rest, that she was going somewhere—fast.

He looked around, as far as his bonds would allow him. Not far away, in another chair, was Valerie Wayne. She was conscious. Her eyes met his. Under happier circumstances that glance would have made him almost delirious with joy. For, in addition to an expression of most heartfelt apology, it told him that he, John Cartwright, was an object of great concern to the girl. As she was tied as efficiently as he was himself there wasn't much she could do about it.

A splendid figure in his scarlet, gold-braided coat and white breeches, Broderick was lounging in the captain's easy-chair.

"You may go now," he said. "We will ring if we want you."

"O.K., boss. Sorry. Your majesty."

There was the sound of a door closing behind the prisoners as whoever had done the face slapping departed.

Broderick sat on his shoulder blades and lit a cigarette.

"Now we can let our hair down," he said. "I feel, commander, that I owe you an explanation—"

"You must be psychic," said Cartwright. "Where's that young swine, Hamilton?"

"Captain—or should one say 'admiral?'—Hamilton is now at the controls. Strange though it may appear, he has evinced no desire to meet either you or Miss Wayne. On the contrary, in fact.

"Where are the others?"

"All safe on 596. Even Kayne.

We wished to make him walk the plank—in other words to stroll out through the air lock without a spacesuit. But the chief of our intelligence—your sister, my dear—dissuaded us. I shall have to do something about that girl. She's far too humane. It must be love."

"You see?" said the girl, eagerly. "She's not bad, really. It is only exile to Ceres that has—"

"Rubbish, my dear," interrupted the self-styled monarch. "She's tarred with the same brush as the rest of us. But let's get on with the washing.

"You may think yourself hard done by, commander, but all this is the result of long months of planning. There was a certain element of luck involved—your Mr. Hamilton was a gift from the gods. But Miss Wayne—she's here because *we* wished it. She had to be here so that we get her sister into the *respectable* part of the ship."

*"You!"* flared the girl. "I was sent on this trip by the P.R.L.!"

"I know, my dear, I know. And what is the P.R.L.? One of the many organs of the Broderick clan. Not openly, of course. But the editors of the Latter Day Democrat newspapers have had their orders to give you people a favorable write-up, you have been given L.D.D. time over the air. You wouldn't know, of course, that the majority of your members are also Latter Day Democrats. But I can assure you that they are."

"And all this," said Cartwright scornfully, "to get William Broderick out of jail!"

Broderick laughed easily.

"I fancy myself, commander, but not that much. No, there's far more at stake than my comfort. But let me continue.

"*Charon,* as you know, cracked up on sailing. That was sabotage. We wanted to get a ship with inexperienced officers in her place. The cylinders of anaesthetic gas were not fitted. When they finally came, it was too late to make a test. They contained, of course, just ordinary atmosphere under pressure. So far, so good. But, now, we were dealing not with machinery, but with incalculable human beings.

"That's where your sister came in, Miss Wayne. A gifted and talented girl. She knew you—better, perhaps, than you know her. She said that you were sure to fall for her scheme of an exchange of identities. She let you suggest it, let herself be argued into it.

"And whilst you were slumming, seeing how the poor live, she'd got her claws into our Mr. Hamilton. She was sure that she'd be able to find one junior officer—or even a senior—that she could use. She was right—and she sure picked a beauty. An astronaut *and* an armaments expert.

"She thought it advisable that the big scene should be staged on one of the days when you were your yourself in your own quarters, writing up your notes. One reason was that she, a trained actress, could put a far better show over the air than an amateur. The other—well, she was afraid that some of the boys, in their enthusiasm, might carry things a little too far.

"Hamilton, of course, was in the know. It was he who put knockout drops in the guards' beer."

"But what do you hope to get out of it?"

"We have nothing to lose. The worst that can happen to us is exile to Ceres. And we shall, at least, have had a run for our money. But if things go well, we shall gain plenty.

"Do you know where we're bound now? Mars. Oh, we're not invading, although we could, almost, do so. No, we're just threatening. With that nice little auxiliary converter of yours we're going to make a pile of atomic explosives and bomb the power station, unless our terms are met. And you know what *that* means. Everything stops on Mars once the first bombs connect at Port Gregory. Transport, light, heat, and the compressors which maintain a breathable atmosphere in the cities. The Earth government will have to come to terms—especially with the L.D.D.s bringing pressure to bear."

"You can't do it," said Cartwright flatly. "Accurate bombing will be impossible unless you bring the ship right down. And that's just absurd."

"But we're using Mr. Hamilton's magnetic torpedoes. It's an atomic power station, isn't it? Well, we can't miss. From *any* range.

"But the terms.

"First—recognition of Ceres as a sovereign state.

"Second—the right to own, build, and operate spaceships.

"Third—the unsterilization of myself and all my people.

"Don't you see what it will mean? It will mean the colonization of the Belt by a tough breed of men and women. It will mean, ultimately, that Man's frontiers will be pushed forward far farther and faster than they will be under our present, namby pamby rulers. It will mean, I think, war and piracy among the stars—but that, with an expanding culture, is good. The race can't expand properly when it's composed of white rabbits. Read your history. Consider the big men who pushed out from the Old World to the East and the West. Were they explorers or slavers, or pirates? All three, I guess."

"Men against the stars," said Cartwright. "*Real* men. If they came any more real, they'd be swinging from trees with the same furry tails as our first, hairy parents. I've been with *real* men clear out to Pluto. *Men,* I tell you, not jailbirds. And those same men would have sold their souls for a ship capable of making Alpha Centauri!"

"You supercilious—!" exploded Broderick.

Then the angry flush left his face, and he resumed.

"I had hoped to have you with us. But I see that you've sold your soul to the little white rabbits. And so you and Miss Wayne come along with us in your original capacity. As ballast. I beg your pardon. Hostages, I mean."

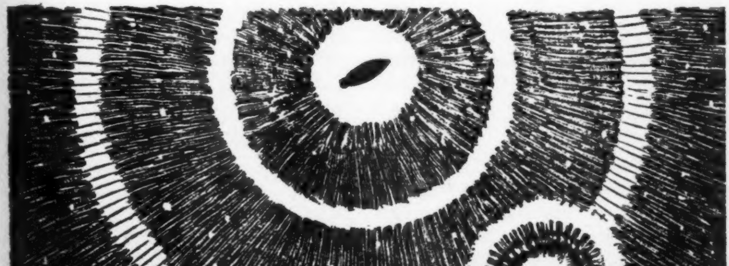
He pressed the button by his side.

"Guards! You may return the prisoners to their quarters!"

The worst part of the period of imprisonment was the uncertainty. Broderick—whether it was on account of Audrey Wayne's influence, or because of a primitive desire to make public sport of his captives, is not known—had them at his table with every meal. And it is certain that the strained relations existing between the commander and his erstwhile subordinate must have been exquisitely funny—provided that one had the right sense of humor.

The harrowing uncertainty filled the time between meals. "As ballast," Broderick had said. *As ballast.* So it was with acute anxiety that both Valerie and Cartwright awaited the call to table. Suppose they took their place at Broderick's board—and there was a vacant chair? He had wanted, they knew, to make Kayne "walk the plank."

Meanwhile, the automatic machinery of the ship continued its many and varied functions, oblivious of the change of masters. In odd corners things clicked, and ticked, and traced intricate graphs on paper-



covered drums. In the Radio Office, the long "toilet roll" unwound, sometimes fast when the ether was full of messages, sometimes slowly. Summaries of interplanetary news were there, personal messages to *Thunderbird's* crew—which they would never receive—Notices to Astronauts. Orbits of any new navigational dangers were there, comets and meteors, all manner of cosmic debris, and the precalculated courses of all shipping in Space.

*Thunderchild* cleared from Port Gregory for Port Lasalle, Ganymede. *Thunderchild* roared up from the desert landing field, and swung in a great arc north of the Plane of the Ecliptic, over the Belt, for the Moons of Jupiter. Had she sailed a little earlier she might have seen the little red flashing beacon, endlessly sending out the numeral 596.

Aboard her sister ship the traitorous navigator skimmed through his Notices to Astronauts. *Just a few thousand miles to port,* he thought, *and we shall see her. Why not test the torpedo on a moving target? It's too easy lobbing 'em at a stationary power station. I must put it to Broderick—*

So it was that, a few nights later, Cartwright and Valerie were surprised at being escorted not to their quarters, but to the control room, after dinner. Hamilton fidgeted nervously until they were lashed into chairs. Here, in what had been the commander's holy of holies, he was far less sure of himself than he was at table. But he took hold of himself. Even here, he had the backing of Audrey, and Broderick, and four of the latter's bullies.

"*Thunderchild*—I admire your system of nomenclature for the ships on the Jovian run. That reminds me, I must have this old scow"—Cartwright was pleased to see that Hamilton winced—"rechristened *Revenge*. But where was I? Oh, yes. *Thunderchild* is due to pass this way very shortly. And our Captain Hamilton asked me if he could try his torpedo on a moving target. You are familiar with its operation, I take it?"

"Yes, Broderick," said the commander. "Too familiar."

"You most certainly are," said the King of Ceres, a little childishly. "But we will cure that.

"Hamilton! Is all ready?"

"Yes. A temporary launching rack has been rigged in the starboard air lock. The firing switch is here."

He lightly touched a new and somewhat crude looking little lever, which looked rather incongruous among its highly polished neighbors.

Broderick frowned at the second omission of his rank and title, but said nothing. His look conveyed that Hamilton was soon to get what was coming to him.

They picked up *Thunderchild* almost before the screens heralded her approach. Leaning back in their chairs and looking up, and a little to starboard, they could see her bearing down on them like a bolt from the hand of Jove himself, a strange, rapidly waxing star among the stars.

Cartwright could imagine well how things were aboard the other ship. The officers would be gathered in control, discussing the strange vessel that was bearing down on them from their zenith. They would decide, he thought, that, for once, the routeing officers had slipped up badly.

The most fantastic thing of all, he said later, was the thought that *Thunderbird's* up was *Thunderchild's* down—for the acceleration in both vessels would make the direction *down* exactly opposite to that of the line of flight.

*Think of it,* Cartwright told himself. *There, above my head, are people walking and talking with their feet in the air—*

Perhaps they were having an after-dinner dance aboard the other ship. The thought of the upside-down couples circulating on the topsy-turvy floor almost made him smile. Almost. For the thought of what was going to happen to those same people in a very short time was far from funny.

For the hundredth time he strained at his bonds. But the man who had lashed him to the chair knew his job.

Hamilton's hand was poised over the firing key.

"Hamilton," said Cartwright in a low, tense voice, "do you realize what you're doing? This is sheer, wanton murder. To think that a swine like you ever wore the black and gold!"

"I know what I'm doing," said the renegade. I can just imagine the superior smile with which he said it. "I'm firing far too early, really. In actual practice I'd allow far less deflection. But I want to demonstrate that my torpedo can't miss—not even when the target has ample time to get clear. There's no escape."

He cut *Thunderbird's* drive, so that she was falling free towards her sister ship, her magnetic fields at a minimum.

"Fire!" he said.

He pressed the key.

"This is where we start getting our own back!" snarled Broderick.

"Hamilton!" said the commander. There was a world of contempt in his voice.

Slumped in her chair, Valerie Wayne was sobbing bitterly.

Then, through the starboard ports, they saw the projectile. It must have come round in a great, lazy arc, and now it was speeding up and away, with unerring aim, towards it victim. It looked, they said afterwards, like a little rocket ship. Just a model, a toy. A devil's toy.

Audrey Wayne looked at the two prisoners, then at Hamilton.

"Jim," she said, "this has gone far enough, I think."

"Yes. Too far."

"And little Audrey laughed and laughed," said the girl, "because she knew it wasn't loaded."

"Yes," said Hamilton, "there's no charge in it. Just a harmless flare so we can see when it strikes. And the plastic of which it's made is too soft and brittle to penetrate butter."

"And the cream of the joke," put in Broderick, "is that it *is* loaded. After you'd set the beastly thing up in the air lock and come forward, one of my men slipped in a good, hearty charge. I know nothing about these matters, but I should imagine that it's sufficient to blow a young planet to smithereens!"

Hamilton, they say, was like a man paralyzed. With no acceleration to play the role of gravity, and with no bonds to hold him down, he couldn't slump in his chair. But he did his best. He looked appealingly at Cartwright as though for help, although what aid he really expected from his bound and captive commander is a matter for conjecture.

Cartwright thought hard. There must be a way, he knew. There *was* a way, if he could only think of it. He toyed with the idea of cramming on power and chasing the rocket projectile. But that wasn't very practicable — even assuming that Broderick would allow Hamilton to do it. But wait!

"If that charge is as big as you say, Broderick," he remarked, "this section of space is going to be a little hell of atomic fire and flying fragments. And I calculate"—he cocked his eye aloft—"that we shall be just about abeam of *Thunderchild* when the torpedo hits her."

"Why should *you* worry?" sneered the little king. "I always thought that in your officers' code, death came before dishonor. But I guess that, at bottom, you're just like the rest of us, your own skin comes first.

"But is that true, Hamilton? Shall we be within the danger area when your toy explodes?"

"Yes. I guess so."

"Then switch on the power. Get us out of here before the blasted thing goes up. Hurry!"

Hamilton shot a glance at Cartwright. He knew.

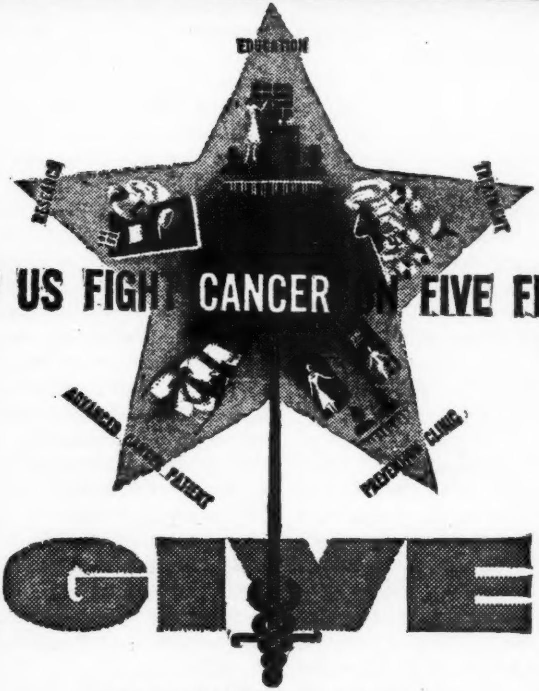
He should have thought of it himself, but the realization of the vile, hopelessly incriminating trick that had been played on him had, momentarily, driven all else from his mind.

Recklessly, he punched buttons and pulled down levers. The violent acceleration pulled those who were seated deep into their chairs, flattened those standing to the deck. It would have been almost impossible for the second pilot to cut the drive now, even if he had wished. It would have taken long, agonizing minutes for him to have lifted even a finger against the giant's pull of pseudogravity.

In terms of distance, the torpedo must have been midway between the two ships. In terms of magnetic attraction, *Thunderchild* was having it all her own way—until *Thunderbird's* flared into violent life. Then—it was a tug of war between the ships, with *Thunderchild* the preordained loser.

When any kind of atomic motor begins to function there is, at first, an uncontrollable surge of free magnitrons. For some reason, not yet explained, those with red polarity flow, along the ship's structure, away from the converter. Those with blue polarity stay put. The

CANCER KILLS 1 ADULT OUT OF 6—IT MAY KILL YOU!


EDUCATION
RESEARCH
TREATMENT
ADVANCED CANCER PATIENT
PREVENTION CLINICS

HELP US FIGHT CANCER ON FIVE FRONTS

GIVE

TO CONQUER CANCER

YOUR GIFT MAY SAVE YOU—OR THE LIFE OF SOMEONE DEAR

SEND YOUR CHECK NOW, AS GENEROUS AS YOU CAN MAKE IT

If you live in the Metropolitan area
of New York, send your check to:
NEW YORK CITY CANCER COMMITTEE
130 East 66th Street
New York 21, N.Y.

AMERICAN CANCER SOCIETY
350 Fifth Avenue, New York 1, N.Y.

I enclose my contribution of $________ to aid in the Fight Against Cancer.

Name________

Street Address________

City________ State________

result is a magnetic field of almost immeasurable intensity, strong enough, to quote the spaceman's hyperbole, to pull an asteroid out of its orbit. Strong enough, in all certainty, to pull a little, Mumetal needle away from any previous allegiance, the Law of Inverse Squares notwithstanding.

All this the commander had realized.

*Death before dishonor.*

As Broderick had said it—a trite phrase, almost cheaply humorous in its implications. And yet—it has only been its use by those who have had no intention of living up to it that has brought it into disrepute.

*Death before dishonor.*

Whose impending doom, I often wonder, bulked biggest in his eyes? Valerie Wayne's — or *Thunderbird's?*

Cartwright could never be sure, but he thought that *Thunderbird* actually overhauled and passed the torpedo. He saw something flicker past the control viewports, something like a little ship, with a fiery tail, going the same way on a roughly parallel orbit. Roughly parallel, I say, for, a few seconds later, the missile struck.

A little aft of amidships it must have been. Had it been forward of the hold, there would have been no survivors. But the cargo took some of the force of the explosion, and the tongues of atomic fire that licked through compartments and along alleyways didn't quite reach the control room.

It has often been said that terrible disasters are far more spectacular to the onloker than the participator. So it was in *Thunderbird's* case. *Thunderchild's* officers, peering intently through their glasses at the other ship—by this time they had recognized her—saw her blossom, suddenly into a great flower of flame. It was a sight never to be forgotten, almost, as one of them said, like having a ringside seat at a Nova.

But *Thunderbird's* personnel saw none of this. It is indeed doubtful whether any of them felt anything, even. Those in control felt nothing. The shock was too dreadful, too sudden, to register. The freakish feature of the whole business is that they survived it.

When they recovered consciousness, they found themselves in a little world—a world spinning lazily on its axis. All around them, as seen through the ports, was a cloud of debris, not all of it inorganic. Either the bulkheads or the emergency doors — which had closed automatically—must have been ruptured, for a thin, shrill whistle of escaping air formed an inescapable background to every thought, word or action.

Broderick was the first completely to recover. Gingerly, he extricated himself from the tangle of arms, legs and bodies that hung in the approximate center of gravity of the compartment. He looked "down" at Hamilton and the prisoners, still in their chairs. At some time the second pilot must have snapped his safety belt into place.

"You knew," he said at last.

"You must have known. I am King for but a little longer, but I still hold the power of life and death—"

He tugged at the holster at his belt, pulled out an old-fashioned pistol that was the mate of Kayne's. Or, perhaps, it was Kayne's.

Unsteadily, he leveled the weapon, squinted along the sights, Hamilton made no attempt to save himself. Perhaps he was still too dazed. Perhaps he just didn't care. Perhaps he saw, in the vengeful Broderick, the fate that he so richly deserved.

"Go on," he whispered. "Get it over with!"

"Die, double traitor!"

Broderick pulled the trigger, but a split second before the shot rang out, a hurtling form knocked him to one side. He missed. The recoil threw him back to fetch up with an audible thud against the big, round port right in the ship's nose. The heavy slug spanged and whined around the compartment until, at last, a cry told that it had found a billet in one of the guards.

Broderick fired again. A split second later, another shot rang out. Where the king's face had been was an obscene, bloody mask. But he hadn't missed with his last shot. Hamilton, drawing an outlandish looking weapon of his own manufacture from a secret shoulder holster, had been too late to save Audrey Wayne. She floated motionless, a dark wet satin spreading across the front of her scarlet dress.

"Audrey!" cried Hamilton.

Then again—"Audrey!"

He released himself from his chair, and drifted "up" to where the girl's body hung suspended at the center of gravity. He made to draw her to him, but one of the surviving guards, actuated by the devil knows what brutal motive, snatched her from him, the impetus imparted by his pull sending her crashing against the control board.

Then the second pilot went berserk.

His gun came out again, and for long minutes the compartment echoed and re-echoed with the thunder of his fire. It was like, the commander said afterwards, a barracuda loose in a goldfish bowl. The guards tried clumsily to escape, but, with their untrained muscles all they accomplished were futile flounderings. The last man was screaming with terror when Hamilton finally finished him. It all took so long because the second pilot hadn't been shooting to kill.

Then he went to the prisoners.

"Have you a knife?" he asked.

"No. But what's wrong with Broderick's sword?"

"Of course." He went to get the weapon, then returned. "The thing was some use after all—" he said. Then—"The spacesuits are in the locker. I saw *Thunderchild* cut her drive, so I suppose she's turned and is coming back as hard as she can. You'll have the air tanks of the other six suits, so you should last out comfortably."

"But what about you?"

"No. After all, this was *my* ship when I lost her. And you and Valerie might need that extra air yet; it'll take a long time for *Thunderchild* to decelerate and start coming back after she has turned."

Cartwright helped Valerie into her suit. There was need for haste. The air was getting very thin. He shrugged himself into his own.

Hamilton was speaking again.

"The Golden Journey—" he said. "I thought that this was to be the Golden Journey for me, but it's better the way it is. But this can be the Golden Journey for you and Cartwright, Valerie. You've got each other, and you've got a common cause to fight for, now. Here!"

He gave the girl a little, black notebook.

"Fight the Brodericks for all you're worth. Both of you. It's all in here. A tale of bribery, corruption, and crime. Their dope rings to get control of powerful men, either directly or through their wives. That should interest *you,* Cartwright—"

He was gasping a little for breath.

Audrey Wayne moaned and stirred.

"Jim— Jim— Where are you? It's dark—"

"Here. I'm here, darling. Cartwright, Valerie, give me a hand to get a spacesuit on her!"

"No. It's too . . . late— And I don't want to die"—the ghost of a smile played across her lips—"in prison. Is Val here? Look after her . . . commander. But what . . . is that? A . . . bell? How . . . strange—"

At the finish, her voice came strong and clear.

*"And softly through the twilight beat the*
*bells*
*Along the golden road to—"*

And that was all.

"Audrey!" cried Hamilton. He turned a tear-stained face to the others. "It was cruel," he said. "She shouldn't have come back for just a little while like that—"

And before Cartwright and the girl could put into effect their plan of forcing him into a suit, he turned his pistol on himself and blew a gaping hole in his chest.

Valerie and the commander snapped tight the visors of their helmets and, hand in hand, awaited the coming of *Thunderchild.*

For them, the Golden Journey was just beginning.

THE END.

LIGHTER MOMENTS with fresh Dated Eveready Batteries

BUY WAR BONDS

"See, Fido! Like this!"

*Keep your eye on the Infantry—the doughboy does it!" Work for victory and spend your earnings on War Bonds.*

EVEREADY" flashlight batteries are playing a vital le in this global war. The Army, Navy, Marines d essential war industries require nearly our entire oduction of these dependable, long life batteries. bviously, that leaves a very limited supply for vilians.

However, important new developments have been ade in "Eveready" flashlight batteries. As soon as e war is over you will get all the batteries you ed and they will be even better and more service-le than their pre-war predecessors.

Fresh DATED BATTERIES Last Longer
Look for the date line

Nº 950
EVEREADY
TRADE MARK
EXTRA LONG LIFE BATTERY
A NATIONAL CARBON COMPANY PRODUCT
SEPT. 1945
FOR BEST RESULTS PUT IN SERVICE BEFORE

EVEREADY
TRADE-MARK

## ANYONE WHO KNOWS CAN TELL THE REAL THING!

## ...THAT'S WHY CLEAR HEADS CHOOSE

## Calvert

**If you've a taste** for fine whiskey, you're certain to recognize Calvert as "the real thing". For it has a pre-war quality and excellence that simply can't be imitated.

That's probably the reason why, year in and year out, people who sell and serve Calvert tell us: "It's the whiskey most often asked for by name."

Once you taste this gloriously mellow blend, *you'll* keep asking for Calvert. It's America's finest whiskey from the House of Blends!

R

Calvert
RESERVE

Calvert Distillers Corp., N.Y.C. BLENDED WHISKEY
86.8 Proof. "Reserve": 65% Grain Neutral Spirits..."Special": 72½% Grain Neutral Spirits

Y

HOOSE

rt

al Spirits